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NTIS/PS-77/0634

# Lead Batteries

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Search period covered

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NTIS

U.S. DEPARTMENT OF COMMERCE
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Springfield, Va. 22161

**BIBLIOGRAPHIC DATA SHEET**

1. Report No.

2.

3. Recipient's Accession No. NTIS/PS-77/0634

4. Title and Subtitle

Lead Batteries
(Citations from the Engineering Index Data Base)

5. Report Date August, 1977

6.

7. Editor(s): Mona F. Smith

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

Same

13. Type of Report & Period Covered 1970 - July, 1977

14.

15. Supplementary Notes Supersedes NTIS/PS-76/0550. For the companion Published Search of the NTIS Data Base, see NTIS/PS-77/0633.

16. Abstracts

Worldwide research on lead battery components, charging, corrosion, and testing is cited. The majority of studies concern battery use in electric vehicles. Studies on lead recovery from battery scrap and air pollution at battery factories are also included. (This updated bibliography contains 231 abstracts, 53 of which are new entries to the previous edition.)

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21. No. of Pages

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Consideration has also been given to the frequency of issue, ease of handling, cost, and the varying needs of the user. Thus Ei produces only one item, that is, the identical Ei abstracts and citations that are in the master data bank are available in annual and monthly frequencies as well as in printed, computer-readable, and microforms.

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These reports are not available from NTIS.

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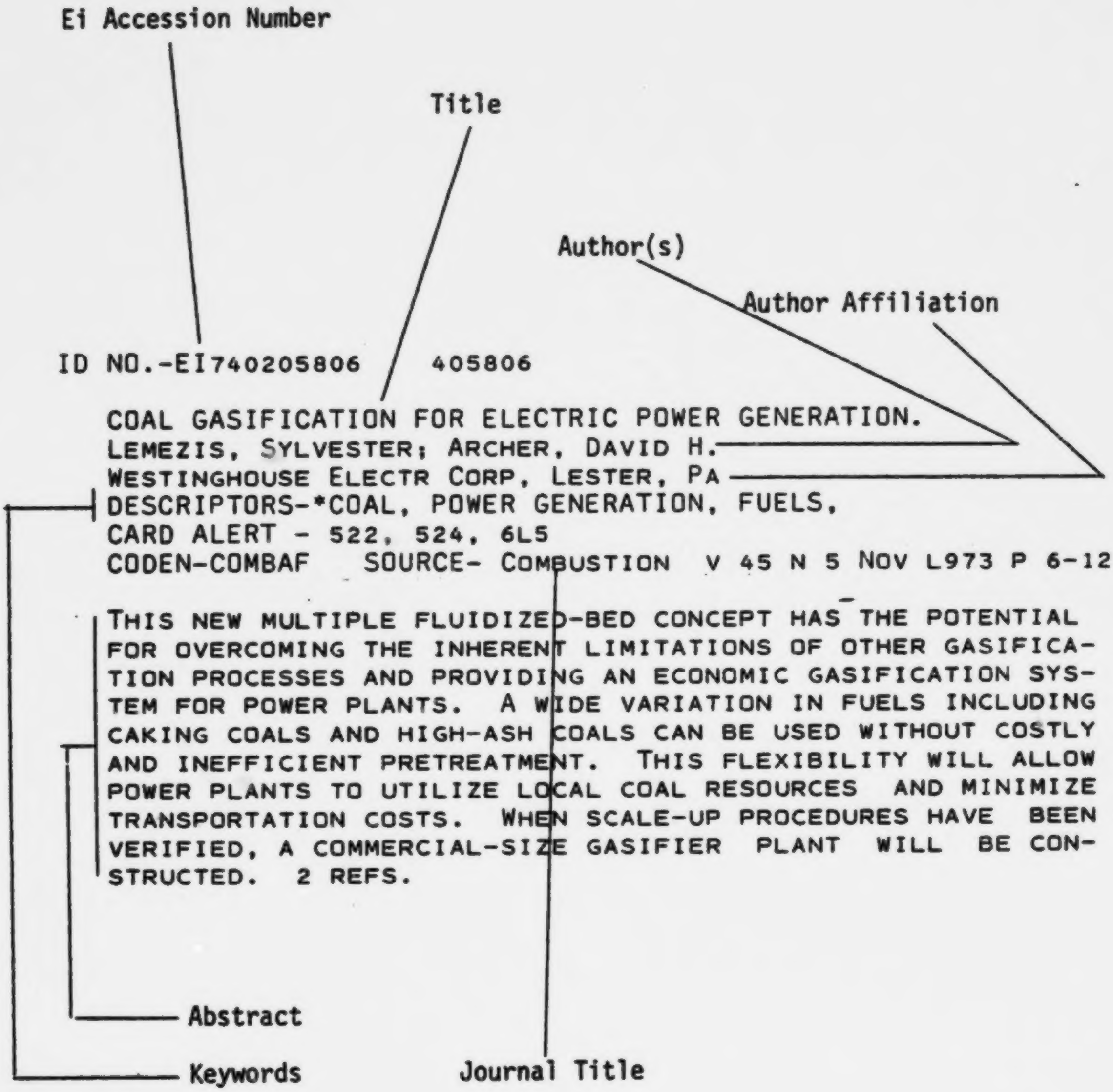

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ID NO.-EI740205806     405806

   COAL GASIFICATION FOR ELECTRIC POWER GENERATION.
   LEMEZIS, SYLVESTER; ARCHER, DAVID H.
   WESTINGHOUSE ELECTR CORP, LESTER, PA
   DESCRIPTORS-*COAL, POWER GENERATION, FUELS,
   CARD ALERT - 522, 524, 6L5
   CODEN-COMBAF   SOURCE- COMBUSTION  V 45 N 5 NOV L973 P 6-12

   THIS NEW MULTIPLE FLUIDIZED-BED CONCEPT HAS THE POTENTIAL
   FOR OVERCOMING THE INHERENT LIMITATIONS OF OTHER GASIFICA-
   TION PROCESSES AND PROVIDING AN ECONOMIC GASIFICATION SYS-
   TEM FOR POWER PLANTS.  A WIDE VARIATION IN FUELS INCLUDING
   CAKING COALS AND HIGH-ASH COALS CAN BE USED WITHOUT COSTLY
   AND INEFFICIENT PRETREATMENT.  THIS FLEXIBILITY WILL ALLOW
   POWER PLANTS TO UTILIZE LOCAL COAL RESOURCES  AND MINIMIZE
   TRANSPORTATION COSTS.  WHEN SCALE-UP PROCEDURES HAVE  BEEN
   VERIFIED, A COMMERCIAL-SIZE GASIFIER  PLANT  WILL  BE CON-
   STRUCTED.  2 REFS.
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ID NO.- EI770639446 739446
ON THE EFFECT OF SOME INORGANIC ADDITIVES ON THE CYCLE LIFE OF THE POSITIVE ELECTRODES IN THE LEAD-ACID CELL.
Abdul Azim, A. A.; Ismail, A. A.
Natl Res Cent, Dokki, Cairo, Egypt
*ELECTRODES, ELECTROCHEMICAL
CARD ALERT: 539, 702
J Appl Electrochem v 7 n 2 Mar 1977 p 119-125 CODEN: JAELBJ

The effect of Sb//2O//3, AS//2O//3 and P//2O//5 on the cycle life of the lead-acid cell is studied with the help of a small cell which avoids the complicating factors encountered in a complete cell. The behavior of the active mass in absence and presence of different concentration of the additives was compared with the corresponding behavior of pure $alpha$ - and $beta$ -PbO//2. X-ray as well as microscopic examinations of the active mass were carried out. It is shown that Sb//2O//3 (and to a lesser extent AS//2O//3) enhance the oxidation of basic sulfate into $alpha$ -PbO//2. The latter modification yields double the capacity than that obtained for $beta$ -PbO//2. 13 refs.

ID NO.- EI770639201     739201

RESEARCHERS STUDY NEW BATTERIES.

Anon

DESCRIPTORS: (*ELECTRIC BATTERIES*Research) (ELECTRIC BATTERIES, PRIMARYResearch) (ELECTRIC BATTERIES, SECONDARYResearch)

CARD ALERT: 702

Electr Veh v 62 n 4 Dec 1976 p 21 CODEN: EVBAAS

A new type of battery, which, it is believed could store up to 20 times more energy for its size and weight than the present lead-acid kind is being investigated by a U. S. Government sponsored research team at the Energy Research & Development Administration's Lawrence Livermore Laboratory in California. Concurrently, tests with nickel-zinc batteries are being undertaken by the National Aeronautics & Space Administration's Lewis Research Center in Cleveland, Ohio. As a part of their studies, the Lawrence Livermore researchers are exploring similar batteries based on reactive but potentially less expensive metals such as calcium, magnesium, aluminum, sodium and their alloys. These batteries are of the primary type, that is to say they are $left double quote$ recharged $right double quote$ by replacing the lithium rather than by being recharged electrically. A sample nickel-zinc battery at NASA Center makes use of cells produced by two industrial contractors, a feature of which is an inorganic separator adapted from space battery technology. The battery has been installed in an electric utility van, using a battery weight equivalent to the conventional lead-acid type. Tests have shown that with the nickel-zinc battery it was possible to make almost twice as many stop-start driving cycles per charge as with the lead-acid battery (190 to 99). Driven at a constant speed of 20 mph, the van ran for 54. 9 miles with the nickel-zinc battery and only 29. 4 miles with the lead-acid before recharging was necessary.

ID NO.- EI770639200 739200
BATTERY COUNCIL INTERNATIONAL CONVENTION, 87TH, 1975.
Anon
Battery Counc Int, Burlingame, Calif
DESCRIPTORS: (*ELECTRIC BATTERIES*Manufacture)(ELECTRIC BATTERIES, SECONDARYGas Emission)(AUTOMOBILESElectric)
CARD ALERT: 702, 662, 705
Battery Counc Int Conv, 87th, Hollywood, Fla, Apr 8-10 1975 Publ by Battery Counc Int, Burlingame, Calif, 1975 176 p

Twenty two papers by various authors are presented. The topics discussed are: Service life, electric vans, sodium sulfur batteries, safety, marketing, separators, lead poisoning, environmental control, maintenance-free batteries, sealed and miniature batteries, and cycling behavior.

ID NO.- EI770639199 739199
BATTERY COUNCIL INTERNATIONAL CONVENTION, 88TH, 1976.
Anon
Battery Counc Int, Burlingame, Calif
DESCRIPTORS: (*ELECTRIC BATTERIES*Manufacture)ELECTRIC BATTERIES, SECONDARY(AUTOMOBILESElectric)
CARD ALERT: 702, 662, 705
Battery Counc Int Conv, 88th, Mexico City, Mex, Apr 27-28 1976 Publ by Battery Counc Int, Burlingame, Calif, 1976 114 p

Twenty-one papers by various authors are presented. The topics discussed are: international standards, markets, energy outlook, vehicles, sodium sulfur and iron air batteries, managing, lead acid and alkaline lead batteries, and battery electric autos.

ID NO.- EI770531261 731261

COMPORTAMIENTO DE ELECTRODOS DE BASE PLOMO, CON Y SIN CAPA DE PbO//2, EN ACIDO SULFURICO DE BATERIAS. $left bracket$ Behavior of Lead-Base Electrodes, with and without a PbO//2 Layer, in Sulfuric Acid as Used in Batteries $right bracket$ .

Gonzalez, J. A.; Fullea, J.

Cent Nac de Invest Metal, Madrid, Spain

DESCRIPTORS: (*ELECTRODES*Corrosion) ELECTRIC BATTERIES

CARD ALERT: 702, 539

Rev Metal (Madrid) v 12 n 4 Jul-Aug 1976 p 190-196 CODEN: RMTGAC

Experimental data are presented on corrosion kinetics of pure lead on Pb-Sb alloy electrodes, with or without a PbO//2 surface layer, in either overcharged or completely discharged electric batteries. 27 refs. In Spanish.

ID NO.- EI770529543     729543
POWER SOURCES FOR ELECTRIC VEHICLES.
Kordesch, Karl V.
Union Carbide Corp, Cleveland, Ohio
DESCRIPTORS: (*AUTOMOBILES*Electric)
CARD ALERT: 662, 705
Mod Aspects Electrochem n 10 1975 p 339-443   CODEN: MAECAC

This article contains a detailed discussion of automotive battery systems. It includes a number of tables that give electric-vehicle specifications, energy- and power-density requirements, criteria for electric car power sources, a comparison of battery systems in particular the lead-acid battery (materials, methods of charging, and future improvements). Fuel cells (and hybrids) are also discussed extensively. 98 refs.

ID NO.- EI770425360 725360
MICROSTRUCTURAL ASPECTS OF GRID CORROSION IN THE PbO//2 ELECTRODE.
Marshall, Dennis; Tiedemann, William
Globe-Union, Inc, Milwaukee, Wis
DESCRIPTORS: (*LEAD COMPOUNDS*Corrosion)ELECTRIC BATTERIES, SECONDARYELECTRODES, ELECTROCHEMICAL
CARD ALERT: 539, 546, 702
J Electrochem Soc v 123 n 12 Dec 1976 p 1849-1855 CODEN: JESOAN

A radical change in microstructure was examined for its effect on the mode of corrosive attack and corrosion rate for a 5 wt. % antimonial lead alloy. Metallography on as-cast microstructures indicates a transition from interdendritic to general attack with increasing overpotential. The potential region for general attack corresponds to a breakdown in the passivating abilities of PbO//2 and is marked by a sharp rise in the corrosion current. A simple heat-treatment, which alters the structure of the eutectic material, reduces interdendritic attack over the entire potential region studied. 17 refs.

ID NO.- EI770423491     723491

ZUM VERLAUF DER ENTLADEREAKTION POSITIVER AKTIVMASSEN DES BLEIAKKUMULATORS. $left bracket$ Effects of Discharges on Positive Plates in Lead Batteries $right bracket$ .

Reinhardt, P.; Vogt, M.; Wiesener, K.
Tech Univ, Dresden, Ger
*ELECTRIC BATTERIES, SECONDARY
CARD ALERT: 702
J Power Sources v 1 n 2 Dec 1976 p 127-139   CODEN: JPSODZ

Results of a study are reported about the effects of discharges and porous lead dioxide electrodes. If alpha and beta PbO//2 are present side by side, then at low current densities and 45 $degree$ C they share in the discharge reaction to the same extent. With increasing current density and at lower temperatures, a preferential reaction of the beta PbO//2 is observed. All pore areas of the porous electrode become gradually overgrown with lead sulphate during the discharge. There is a decrease in the specific surface of porous lead dioxide electrodes, as a result of the deposition of lead sulphate of small surface area, during the discharge reaction. Discharge temperature and current density influence the size of the lead sulphate crystals, the degree of electrode surface coverage with lead sulphate, the discharged structure, and hence also the capacity of the electrode. 17 refs. In German with English summary.

ID NO.- EI770423488 723488

LIFE CYCLE TESTING OF SLI BATTERIES WITH Pb-Ca-Sn GRIDS CONTAINING VARIOUS AMOUNTS OF BISMUTH.

Devitt, John L.; Myers, Michael

Consult Electr Eng, Denver, Colo

*ELECTRIC BATTERIES, PRIMARYLEAD AND ALLOYSCALCIUM AND ALLOYSTIN AND ALLOYSELECTRODES, ELECTROCHEMICAL

CARD ALERT: 546, 549, 702

J Electrochem Soc v 123 n 12 Dec 1976 p 1769-1772 CODEN: JESCAN

The effects on battery life of lead-calcium-tin grids (Pb $plus$ 0. 07% Ca $plus$ 0. 7% Sn) with bismuth content in the range 7-420 ppm have been studied. Full-sized batteries were cycled to failure using either modified SAE J240 or J537 procedures. The results showed that in the test designed to cause failure by corrosion (SAE J537), no ill effects due to bismuth were noted. In the tests designed to model automotive service (J240), cycle life tended to increase with increasing bismuth content of the grids. 4 refs.

ID NO.- EI770320544 720544

DEVELOPMENT OF ELECTRIC VEHICLES IN TAIWAN.

Mao, K. W.; Hwang, G. J.

Natl Tsing Hua Univ, Hsinchu, Taiwan

DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Light Weight)ELECTRIC BATTERIES, SECONDARY

CARD ALERT: 702

Intersoc Energy Convers Eng Conf, 11th, Proc, State Line, Nev, Sep 12-17 1976 Publ by AIChE, New York, NY, 1976 v 1 SAE Pap 769059 p 357-362

The purpose of the program is to determine the technical and economic feasibility of manufacturing electric vehicles in Taiwan. In phase I of the program, a 4-passenger vehicle has been constructed with a fiberglass reinforced plastic body. The vehicle has a curb weight of 1200 kg, a maximum speed of 90 km/h and a range of 160 km at 45 km/h for one charge. The lead-acid batteries used have a total weight of 500 kg with an energy density of 48 wh/kg (5 hr. rate) and a battery life of 150 cycles (deep discharge to 10. 2 v). The performance of the vehicle is found to be suitable to the local traffic conditions. In phase II, various production prototypes will be developed. 3 refs.

ID NO.- EI770320542 720542
MINIMIZING ELECTRIC CARS TO MAXIMIZE PERFORMANCE.
Shipps, Paul R.
Shipps Eng Serv, El Cajon, Calif
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Energy Utilization)ELECTRIC BATTERIES, SECONDARY
CARD ALERT: 702
Intersoc Energy Convers Eng Conf, 11th, Proc, State Line, Nev, Sep 12-17 1976 Publ by AIChE, New York, NY, 1976 v 1 SAE Pap 769061 p 369-376

A development program for three small, lead-acid battery powered cars is described. Designed for but one or two occupants, the gross weight of the cars range from 680 to 1150 lbs. (310 to 520 kg). During the systems engineering study phase two car types evolved: (1) an upright, comfortable, low-performance $left double quote$ Leisure-Town $right double quote$ car and (2) a low-slung, good acceleration, sport-commuter vehicle. Extensive structural optimization efforts, shape simplification and the elimination of nonessentials keep total weight low to minimize energy requirements. Drive train and control system efficincies also receive much attention; various test data on energy conversion efficiences are provided. Calculated data showing low energy cost per distance traveled is also provided. This is countered by data on first-cost and weight penalties, compared to gasoline engine energy. Finally, the safety implications of such small and light vehicles are discussed, and safety provisions in the designs are described. 8 refs.

ID NO.- EI770317785 717785

LEAD 74: INTERNATIONAL CONFERENCE ON LEAD, 5TH, EDITED PROCEEDINGS.

Anon

Lead Dev Assoc, Eur Lead Dev Comm, London, Engl

DESCRIPTORS: (*LEAD AND ALLOYS*Applications)ELECTRIC BATTERIES(ELECTRIC CABLESSheathing)COMPOSITE MATERIALSAIR POLLUTION

CARD ALERT: 546, 702, 706, 415, 817, 451

Int Conf on Led, 5th, Ed Proc, Paris, Fr, Nov 18-22 1974 Publ by Met Bull Ltd, London, Engl, 1976 239 p

Proceedings include 24 papers on lead batteries, lead cable sheathing, lead composites, and other related topics. Among the subjects discussed are applications of lead batteries in electrically powered vehicles, the reprocessing of scrap batteries, the possibility of using lead-calcium-tin alloys for industrial batteries, the castability of lead-antimony alloys for battery grids, the manufacture of high-lead-content litharge, the extrusion of lead-antimony alloys, the construction of submarine power cables in Scandinavia, superconducting lead and lead alloys, adhesive bonding of lead to steel, roll bonded lead clad steel, the use of lead composites as sound insulators, the properties and appications of lead-filled plastic fibers, the solubility of oxygen in lead, and the role of lead in the contamination of the environment.

ID NO.- EI770316271     716271

JAPANESE LEAD-ACID BATTERIES: NEW TECHNOLOGY AND RECENT PRODUCTS.

Kozawa, A.; Takagaki, I.

US Off of the Electrochem Soc of Jpn, Cleveland, Ohio

DESCRIPTORS: (*ELECTRIC BATTERIES, SECONDARY*Separators)STORAGE BATTERY VEHICLES

CARD ALERT: 702

Intersoc Energy Convers Eng Conf, 11th, Proc, State Line, Nev, Sep 12-17 1976 Publ by AIChE, New York, NY, 1976 v 1 SAE Pap 769091 p 532-536

Developments in the field of new separator materials, high performance and low maintenance automobile and stationary batteries are reviewed. A one-opening battery, new connection, blow molding for ccontainers, semi-sealed portable batteries, and new electric vehicle batteries are introduced. 11 refs.

ID NO.- EI770316268 716268
LEAD-ACID BATTERIES WITH LOW ANTIMONY ALLOYS.
Berndt, D.; Nijhawan, S. C.
Varta Batterie, Kelkheim, Ger
DESCRIPTORS: (*ELECTRIC BATTERIES, SECONDARY*Manufacture)
CARD ALERT: 702
J Power Sources v 1 n 1 Jul 1976 p 3-15 CODEN: JPSODZ

A report is given on lead alloys which contain between 1 and 4% antimony and which are characterized by the addition of selenium. Using the selenium additive a very fine grain structure is achieved which improves castability and grid-quality to a great extent. 12 refs.

ID NO.- EI770316252 716252
CUSTOM CHARGERS AND MATCHED CELLS INCREASE LIFE OF SEALED BATTERIES.
Yeaple, F.
DESCRIPTORS: (*ELECTRIC BATTERIES, SECONDARY*Charging) (ELECTRIC RECTIFIERS, SOLID STATEDesign)
CARD ALERT: 702, 714
Prod Eng v 47 n 10 Oct 1976 p 21-24 CODEN: PRENA5

Totally sealed lead-acid battery now competes with nickel-cadmium battery for portable appliances. Each is available in a design that vents no gases or liquids. Two kinds of lead-acid cells are finding increasing applications: the gelled electrolyte and the absorbed electrolyt In this article, only the absorbed-electrolyte type is compared with the NiCd cell, because they have similar applications: each is abused by overcharge and neglect, yet is not expected to vent nor to lose water. The differences in charging techniques are also examined.

ID NO.- EI770316245 716245

HIGH POWER DENSITY BIPOLAR LEAD-ACID BATTERY FOR ELECTRIC VEHICLE PROPULSION.

Kassekert, D. W.; Isenberg, A. O.; Brown, J. T.

Westinghouse Electr Corp, Pittsburgh, Pa

*ELECTRIC BATTERIES, SECONDARY(PROPULSIONElectric Energy)(STORAGE BATTERY VEHICLESComputer Applications)

CARD ALERT: 701, 702, 723

Intersoc Energy Convers Eng Conf, 11th, Proc, State Line, Nev, Sep 12-17 1976 Publ by AIChE, New York, NY, 1976 v 1 SAE Pap 769070 p 411-417

The goal of an experimental program is the construction and testing of a battery of sufficient size to permit valid extrapolation to larger size batteries. Peak specific power figures of over 200 watts per pound are achieved and the specific energy of a bipolar battery is 12 to 13 watt hours per pound at the two hour discharge rate. It is considered that such a new battery system could be used as power source for buses, service vehicles and personal commuter cars, with moderate cruising ranges of approximately 30 miles (48. 27 km) but with good acceleration and hill climbing capability. It is hypothesized that the bipolar battery concept will also allow rapid battery recharge to extend the cruising range. A vehicle mission study is conducted using computer programs developed and verified for the various types of vehicle systems on other programs. Vehicle system performance for various missions was computed and is reported. 3 refs.

ID NO.- EI770213514 713514
THREE-FIRM PARTNERSHIP PRODUCED THE SILENT KARRIER.
Anon
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*United Kingdom)(MOTOR TRUCKS Electric)
CARD ALERT: 702, 663, 432
Electr Veh v 62 n 2 Jun 1976 p 10-11 CODEN: EVBAAS

The result of a partnership between Chloride Technical Ltd. 's Motive Power Projects Group, Chrysler United Kingdom Ltd. and National Freight Corporation, a prototype battery-powered delivery van capable of speeds up to 40 m. p. h. and of carrying a 35 cwt. (3920 lb) payload has been on trial since February 1976 with a National Carriers Ltd. depot in Birmingham. Silent Karrier, the new vehicle, was shown to the Press at a special launching in Birmingham on 26th April. Silent Karrier is a development of the Dodge-Commer-Karrier range of Chrysler delivery vehicles, with a walk-through design that makes it ideal for battery power. Chloride designed the drive train for the Silent Karrier and is developing a new high-energy density battery which will greatly increase the vehicle's present operating range of about 40 miles in start-stop operation. The first vehicle is fitted at present with Chloride batteries of the lead-acid motive power type, 160 volts, 365 Ah/5 hr. These have a battery life of about four years, or between 1,000 and 1,200 operating days. The controller is the SCR electronic type with regenerative braking facility; power control by constant pulse width, variable frequency followed by pulse widening at higher speeds.

ID NO.- EI770209594     709594

PROCEEDINGS OF THE SYMPOSIUM ON ENERGY STORAGE, 148TH MEETING OF THE ELECTROCHEMICAL SOCIETY, 1975.

Berkowitz, Joan B. (Ed.); Silverman, Herbert P. (Ed.)

Arthur D. Little, Inc, Cambridge, Mass

*ENERGY RESOURCESFUEL CELLSELECTRIC BATTERIESELECTRIC ENERGY STORAGE SUPERCONDUCTING MAGNETSPOWER GENERATION

IDENTIFIERS: ENERGY STORAGE, THERMAL ENERGY STORAGE

CARD ALERT: 901, 615, 701, 931, 702, 643

Proc of the Symp on Energy Storage, 148th Meet of the Electrochem Soc, Dallas, Tex, Oct 5-9 1975 Publ by Electrochem Soc, Inc, Princeton, NJ, 1976 258 p

The Proceedings comprise 16 papers on problems of energy storage. The topics dealt with include: energy storage: applications, benefits, and candidate technologies; capital costs for the implementation of fuel cells and electric storage devices; energy storage technology; use of superconductors as storage elements; hydrogen production, storage, and conversion for electric utility and transportation applications; advanced technology lead-acid batteries; the zinc-chlorine battery; cost and size estimates for an electrochemical bulk energy storage concept; the sodium-sulfur battery; a water-battery concept for electric utility energy storage; the sodium chloride battery; thermal energy storage using fluorides of alkali and alkaline earth metals; thermal energy storage for utility applications; materials stability and compatability in energy storage systems. Individual articles are indexed separately.

ID NO.- EI770209469     709469

EFFECT OF AN INDUSTRIAL EXPANDER ON THE DISCHARGE PROCESS OF A LEAD MICROELECTRODE IN 4. 5 M SULPHURIC ACID.

Le Mehaute, A.

Lab de Marcoussis, Fr

DESCRIPTORS: (*ELECTRODES, ELECTROCHEMICAL*Lead and Alloys)ELECTRIC BATTERIES

CARD ALERT: 546, 702

J Appl Electrochem v 6 n 6 Nov 1976 p 543-550   CODEN: JAELBJ

The presence or absence of an industrial expander is shown to produce a difference in the discharge of a lead microelectrode in concentrated sulphuric acid. The expander acts both before and after passivation, and modifies the concentration and relaxation time of Pb(II) soluble reaction intermediates. 13 refs.

ID NO.- EI770209448 709448

ELECTROCHEMICAL SOCIETY, INCORPORATED, 150TH MEETING, EXTENDED ABSTRACTS OF BATTERY DIVISION, VOLUME 76-2, 1976.

Anon

Electrochem Soc, Inc, Princeton, NJ

*ELECTROCHEMISTRYELECTRIC BATTERIESSEMICONDUCTOR DEVICE MANUFACTURE CORROSIONELECTRODEPOSITIONDIELECTRIC MATERIALS

IDENTIFIERS: ELECTROTHERMICS, POROUS ELECTRODES, ELECTRONICS, HIGH TEMPERATURE ALLOYS, LEAD ACID BATTERIES

CARD ALERT: 539, 702, 801, 802, 712, 722

Electrochem Soc, Inc, 150th Meet, Extended Abstr of Battery Div, Las Vegas, Nev, Oct 17-22 1976 Publ by Electrochem Soc, Inc, Princeton, NJ, 1976 v 76-2, 938 p

This collection contains 360 extended (mostly two-page) abstracts of papers presented at the Fall 1976 meeting of the Electrochemical Society in Las Vegas. They are grouped in 9 sections. The Battery Division papers (70 abstracts) deal with low-maintenance and maintenance-free lead acid batteries and theory and practice of porous electrodes. The Battery-Electrodeposition-Industrial Electrolytic Division papers (12 abstracts) deal with high current density electrode processes. The Corrosion Division papers (23 abstracts) consider in particular corrosion in scrubbing systems. The Corrosion-Electrothermics and Metallurgy Division papers (54 abstracts) investigate corrosion encountered in energy extraction from geothermal brines and steams, and properties of high temperature alloys. The fifth section (6 abstracts) is devoted to dielectrics and insulation. The sixth (62 abstracts) deals with dielectric isolation and semiconductors on insulating substrates and silicon on sapphire, and with materials, devices, and fabrication techniques for image storage and display. The 7th section (45 abstracts) discusses the chemistry and crystallography of electronic materials formed by chemical vapor deposition. The Electrodeposition Division (34 abstracts) considers selective plating. The Electronics Division (74 abstracts) deals with semiconductors, especially with lithographic techniques for device processing, and materials and structures for optical devices.

ID NO.- EI770208803 708803
ADVANCED TECHNOLOGY LEAD-ACID STORAGE (ATLAS) BATTERIES ON ELECTRIC UTILITIES.
Berkowitz, D. G.; Brown, J. T.
Westinghouse Electr Corp, East Pittsburgh, Pa
*ELECTRIC BATTERIESELECTRIC POWER SYSTEMSELECTRIC ENERGY STORAGE
IDENTIFIERS: ENERGY STORAGE
CARD ALERT: 706, 702, 701, 931
Proc of the Symp on Energy Storage, 148th Meet of the Electrochem Soc, Dallas, Tex, Oct 5-9 1975 Publ by Electrochem Soc, Inc, Princeton, NJ, 1976 p 109-120

This paper covers the potential economics for use of large scale storage batteries on electric utility systems. Several application considerations that lead to an accumulation of credits as a result of energy storage or its location on the system are considered. Electric utilities have already experienced some of these benefits with pumped storage hydro installations. The primary benefits result in simply shifting the daily peak loads to off-peak coal and nuclear base plants; therefore displacing the need for peak generation that uses higher cost fuels. With the most recent oil embargoes and shortages, rapidly increasing oil prices have made operation of older less efficient oil burning equipment, as well as the new designs, such as gas turbines, extremely expensive. It is for this reason that conversion to coal burning equipment and an increased emphasis on nuclear generation is being made. For further conservation purposes, commercialization of new economically feasible energy storage techniques must be made, not only from a fuel point of view, but from an overall systems economics point of view.

ID NO.- EI770105283     705283
IMPLANTABLE CARDIAC PACEMAKERS AND THE POST-OPERATIVE REQUIREMENTS FOR ASSESSING PACEMAKER PERFORMANCE.
Furness, Anthony
Univ of Keele, Engl
DESCRIPTORS: (*PROSTHETICS*Pacemakers) (BIOMEDICAL ENGINEERING Surgical Implants) (BIOMEDICAL EQUIPMENTMicroelectrodes) PULSE GENERATORSELECTRIC POWER SUPPLIES TO APPARATUS
IDENTIFIERS: ELECTROSTIMULATION
CARD ALERT: 462, 461, 715
IEEE Med Electron Monogr 13-17 Publ by Peter Peregrinus Ltd, Stevenage, Hertfordshire, Engl, 1975 p 1-47

This monograph briefly reviews the history of implantable cardiac pacemakers, then surveys the state-of-the-art in considerable detail. First the clinical indications for pacing are outlined. Then the phenomena of stimulation are discussed, including threshold level, strength/duration curve, and interface effects. A detailed review of pacemaker systems considers pacing techniques, electrode-lead assembly, pulse generators, and power supplies, including Hg-Zn, nuclear, and Li-I cells. Considered among complications of acardiac pacing are: surgical complications; stimulatory complications (as: exit block, electrode ejection, myocardial perforation); pacemaker complications (as failure of the electrode-lead assembly or generation components, and depletion of the power source). Criteria for assessing pacemaker performance are suggested in the forms of: specifications and measurements (ECG observations, pacing rate, pulse characteristics, pacemaker frontal-plane vectors, X-ray analysis); a pacemaker clinic for postoperative control measurements, visits, and investigation of pacing complications; documentation of pacemaker specifications, measurement profile and follow-up measurements, of patient advice, and of failure analyses. 163 refs.

ID NO.- EI770103636     703636
NEW SULFUR-DIOXIDE-FREE PROCESS FOR RECOVERING LEAD FROM BATTERY SCRAP.
Wilson, D. A.
US Bur of Mines, College Park Metall Res Cent, Md
DESCRIPTORS: (*LEAD AND ALLOYS*Recovery) ELECTRIC BATTERIES( INDUSTRIAL WASTESTreatment) SCRAP METAL
CARD ALERT: 702, 531, 546, 452
Proc of the Miner Waste Util Symp, 5th, Chicago, Ill, Apr 13-14 1976 Sponsored by US Bur of Mines, Div of Solid Wastes, Washington, DC, 1976. Available from Ill Inst of Technol Res Inst, Chicago p 393-397

A laboratory method for processing lead battery scrap has been developed that eliminates virtually all of the SO//2 emission that normally is produced when using a conventional reverberatory or blast furnace. The method employs a hydrometallurgical step to convert the PbSO//4 to PbO and CaSO//4. Conversion is accomplished by mixing the battery scrap with a slurry of Ca(OH)//2. The reaction is exothermic and goes to completion in 5 to 10 minutes at room temperature after the final addition of Ca(OH)//2. The dried product is mixed with a KCl-NaCl flux and carbon and reduced 650 $degree$ C. Lead recoveries as high as 95. 0 percent have been achieved in the laboratory. 18 refs.

ID NO.- EI770101839 701839

POWER SOURCES 5: RESEARCH AND DEVELOPMENT IN NON-MECHANICAL ELECTRICAL POWER SOURCES.

Collins, D. H. (Ed. )

*ELECTRIC BATTERIESTHERMOELECTRIC ENERGY CONVERSIONSOLAR CELLSFUEL CELLSSTORAGE BATTERY VEHICLESELECTROLYTIC CELLS

CARD ALERT: 702, 615, 802

Proc of the Int Power Sources Symp, 9th, Brighton, Engl, Sep 24-26 1974 Publ by Academic Press, Inc, New York, NY, 1975 740 p

Forty-seven papers provide information on research and development, applications engineering, design studies, and user-experience of primary and secondary cells, solar cells, thermoelectric generators, and related subjects. Papers include: gas recombination of lead-acid batteries; battery charging at low temperatures; effects of metallurgical structure on hydrogen evolution on lead alloys; gassing rates of automotive batteries; zinc-bromine storage battery for electric vehicles; iron-air battery systems for traction purposes; high efficiency thermo-mechanical generators; performance characteristics of a long life pacemaker cell; and inorganic electrolyte lithium cells.

ID NO.- EI761285069     685069
HIGH PERFORMANCE ELECTRIC COMMERCIAL VEHICLES FOR CITY USE.
Harding, G. G.
Joseph Lucas Ltd, Engl
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Design)ELECTRIC BATTERIES, SECONDARY
CARD ALERT: 702, 662, 663
SAE Prepr n 760073 for Meet Feb 23-27 1976, 13 p   CODEN: SEPPA8

Lucas Industries Limited commissioned work on electric vehicles some seven years ago in order to provide test beds for batteries which were under development. During the past three years the battery development work has been concentrated on lightweight lead acid batteries and work on the vehicles themselves has been stepped up. A comprehensive electric vehicle development program is now being undertaken. During the last 18 months this has led to the production of fifteen 1 tonne payload vans, a personnel carrier, a 34-passenger city bus and two city taxis. All these vehicles will be used by operators in service for extended periods in order that they can be evaluated from operational, engineering and financial points of view.

ID NO.- EI761285068 665068
ELECTRIC VEHICLE DEVELOPMENT.
Anon
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Design) (AUTOMOBILES Electric) (AIR POLLUTION Control)
CARD ALERT: 705, 662, 702, 451
Automot Eng v 84 n 8 Aug 1976 p 39-43 CODEN: AUEGBB

Storage battery vehicle range can be improved by removing peak currents and by incorporating regenerative braking. Investigations are currently underway into the feasibility of lead acid-nickel cadmium battery systems and motor/generator/flywheel systems.

ID NO.- EI761280401 680401
ENERGY STORAGE TECHNOLOGY.
Vanderryn, Jack
US AEC, Washington, DC
*ELECTRIC ENERGY STORAGEENERGY RESOURCESELECTRIC UTILITIES
CARD ALERT: 701, 931, 611, 706, 702, 901
Converting Existing Hydro-Electr Dams and Reservoirs into Pumped Storage Facil, Eng Found Conf, Proc, Franklin Pierce Coll, Rindge, NH, Aug 18-23 1974 p 12-38. Publ by ASCE, New York, NY, 1975

New concepts for energy storage, all in various stages of technical maturity, offer considerable promise and will provide significant benefits. The electric utility industry estimates that 15-25% of the daytime generating capacity of future utility systems could be provided by suitable energy storage devices. Pumped hydroelectric storage is the only significant energy storage system in current use, and its application will continue to grow. Further growth, however, is limited by the number of available sites, environmental considerations and construction lead times. The new technologies which could ultimately meet the technical (and economic) requirements for utility, transportation, and residential/commercial/industrial energy storage devices are electric storage batteries; hydrogen storage and production; flywheels; underground compressed air storage; underground pumped hydro storage; magnetic energy storage; thermal energy storage. 9 refs.

ID NO.- EI761280351 680351

CASTING AND PROPERTIES OF GRID ALLOYS FOR MAINTENANCE-FREE BATTERIES.

Caldwell, T. W.; Sokolov, U. S.; Bocciarelli, L. M.

NL Ind, Inc, Cent Res Lab, Hightstown, NJ

*ELECTRIC BATTERIES, SECONDARYLEAD CALCIUM ALLOYS

CARD ALERT: 546, 549, 702

J Electrochem Soc v 123 n 9 Sep 1976 p 1265-1271 CODEN: JESOAN

The microstructure, hardness, castability, and hydrogen evolution rate of cast grids were determined for a wide range of Pb-Ca and Pb-Ca-Sn alloy compositions. The calcium oxidation rate of the molten alloys was also studied. These properties were determined as a function of alloy composition, trace element content, and casting conditions. $left double quote$ Alloy $right double quote$ refers to calcium and tin, and $left double quote$ trace elements $right double quote$ refers to bismuth, antimony, copper and silver. 33 refs.

ID NO.- EI761279155 679155
STUDY OF THE ENERGY UTILIZATION OF GASOLINE AND BATTERY-ELECTRIC POWERED SPECIAL PURPOSE VEHICLES.
Sheridan, David C.; Bush, John J.; Kuziak, William R. Jr.
GM, Res Lab
DESCRIPTORS: (*AUTOMOBILES*Fuel Economy) STORAGE BATTERY VEHICLES
CARD ALERT: 702, 662, 521
SAE Prepr n 76011 for Meet Feb 23-27 1976, 17 p CODEN: SEPPA8

The guidelines of this study restricted it to three special-purpose cars that are smaller and have lower performance than conventional sub-compact cars and a delivery van. The most important guideline of the study required the performance levels and load carrying capacity of the gasoline and electric-powered vehicles to be the same. The results of the study indicate that a lead-acid battery powered, two-passenger shopper vehicle with a 40 km range consumed about 90% more petroleum per kilometer of driving than does its spark ignition engine powered counterpart. With coal as the prime source, they consume about the same amount of energy. Increases in desired range, performance and vehicle size beyond that of the shopper increase the electric vehicle energy consumption with respect to the gasoline powered version. 17 refs.

ID NO.- EI761279153 679153

COPPER ELECTRIC TOWN CAR.

Pocobello, Michael; Armstrong, Dan

Triad Serv, Inc

DESCRIPTORS: (*AUTOMOBILES*Electric)

CARD ALERT: 705, 662, 702

SAE Prepr n 760071 for Meet Feb 23-27 1976, 10 p CODEN: SFPPA8

The Copper Electric is a two-passenger prototype powered by eighteen lead-acid, six-volt batteries and driven by a separately-excited motor driving through a fixed-ratio transfer case and a spiral bevel gear set to the front wheels via independent axle shafts. The transfer case incorporates a toothed belt drive capable of handling maximum motor torque. The overall drive ratio is 4. 95:1, resulting in an N/V ratio of 71. 3. Range and performance targets are a maximum speed of 55 mph, acceleration to 30 mph in 12 seconds, range at 40 mph-120 miles and range in simulated city driving $EM DASH$ 74 miles.

ID NO.- EI761279152 679152
DEVELOPMENT OF HIGH EFFICIENCY ELECTRIC MINI-CARS.
Shipps, Paul R.
Shipps Eng Serv, El Cajon, Calif
DESCRIPTORS: (*AUTOMOBILES*Electric)STORAGE BATTERY VEHICLES
IDENTIFIERS: ELECTRIC MINI-CARS
CARD ALERT: 662, 705, 702
Intersoc Conf on Transp, 4th Annu, Proc, Los Angeles, Calif, Jul 18-23 1976 Pap E&F-3, 9 p. Publ by ASME, New York, NY, 1976

Designed to be powered by today's lead-acid batteries and readily available motors, the cars are intended for low to moderate speed urban uses only. Efficient use of energy being the primary development goal, the designs have eliminated nonessentials, simplified body shapes and have emphasized structural efficiency to attain low vehicle gross weights. Electrical system and power-train efficiencies are also emphasized. Two types of cars and three preliminary designs evolved from the systems engineering study phase. Performance predictions and methods are described, as is a test program intended to verify or develop good efficiencies. 10 refs.

ID NO.- EI761177641 677641

LEAD CONTAMINATION OF URBAN SOILS AND VEGETATION BY EMISSIONS FROM SECONDARY LEAD INDUSTRIES.

Linzon, S. N.; Chai, B. L.; Temple, P. J.; Pearson, R. G.; Smith, M. L.

Ont Minist of Environ, Toronto

*SOIL POLLUTIONLEAD AND ALLOYSLEAD SMELTINGAIR POLLUTION

CARD ALERT: 483, 546, 531, 451

J Air Pollut Control Assoc v 26 n 7 Jul 1976 p 650-654 CODEN: JPCAAC

The degree and extent of lead contamination of urban soils and vegetation in the vicinity of secondary lead industries are provided. These urban industries, a secondary smelter reprocessing lead from used batteries and scrap metal and a manufacturer of new storage batteries, were located near residential communities. Levels as high as 21,000 ppm of lead in the upper 5 cm of soil (based on air dried weight) and 3500 and 2700 ppm in willow foliage (not washed and washed, respectively, based on dry weight) were found adjacent to the secondary smelter, with the levels decreasing exponentially from the sources. The data on lead contamination of soils and vegetation at various distances and directions from the urban secondary lead industries were compared with levels of lead found in control urban and highway locations. 10 refs.

ID NO.- EI761070617 670617
DEVELOPMENT OF ELECTRIC VEHICLES IN JAPAN.
Anon
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Research) (AUTOMOTIVE ENGINEERINGJapan)
CARD ALERT: 702, 662, 901
Electr Veh v 62 n 1 Mar 1976 p 18-23 CODEN: FVBAAS

In Japan, a plan instituted in February 1971 and sponsored by the Science & Technology Agency of the Japanese Ministry of International Trade & Industry, resulted in five types of experimental electric vehicles being built by February 1973, together with such components as newly developed types of batteries. The vehicles constructed were a lightweight passenger car and a compact passenger car, one lightweight and one compact truck and a 70-passenger electric bus. In an effort to minimize the weight of the vehicle bodies, research was also undertaken into new types of plastic materials. The target and actual performance specifications of the experimental cars and trucks are tabulated, as are detailed structural data on these vehicles, all of which used dc motors with SCR chopper control and lead-acid batteries. Seven types of battery for traction use were also developed (3 lead-acid, 2 zinc-air, one iron-air, one sodium-sulfur); data on these are also tabulated. Brief descriptions of features such as body construction, controls, and braking systems, not listed in the tables, are given in the text. Plans for further development are indicated.

ID NO.- EI761070616 670616
LUCAS ASSESSING 100-MILE RANGE ELECTRIC TAXI.
Anon
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Research)(TAXICABSLondon, England)(AUTOMOTIVE ENGINEERINGResearch)
CARD ALERT: 702, 662, 901
Electr Veh v 61 n 4 Dec 1975 p 22-24 CODEN: EVBAAS

A prototype, front wheel drive, battery powered taxicab with a range of about 100 miles and a top speed of approximately 55 m. p. h. is being used by Lucas Industries as a traveling test bed for the evaluation of drive systems and other Lucas technology involved. The body has been designed to minimize the overall dimensions and to keep down drag and weight to accomplish maximum utilization of the energy available from the lightweight Lucas lead-acid batteries. The cab meets the specification of the London Metropolitan Police Public Carriage Office. The 50 b. h. p. 216-volt CAV motor which drives the taxi is located transversely at the front of the vehicle, level with the floor of the driving compartment. The motor drive is transmitted to the differential by low-loss double-reduction, Morse HY-VO chains giving a 5. 63:1 drive ratio. The battery pack is carried in a detachable tray located under the vehicle floor. Although the pack can be charged in situ with appropriate equipment, it can also be readily exchanged for a new pack, if necessary. The process is said to take no longer than refueling a conventional vehicle. The Lucas developed control system is of the SCR chopper type.

ID NO.- EI761069444     669444

PVC-SEPARATOREN ALS ELEKTRODEN-TRENNELEMENTE IN AKKUMULATOREN. $left bracket$ PVC Separators as Electrode Spacers in Secondary Batteries $right bracket$ .

Kraus, Helmut

Hoechst, Gendorf, Ger

DESCRIPTORS: (*POLYVINYL CHLORIDE*Processing) POWDERS (POWDER METALLURGYSintering) ELECTRODES, ELECTROCHEMICAL (ELECTRIC BATTERIES, SECONDARYManufacture) (SEPARATORSManufacture)

IDENTIFIERS: ELECTRODE SPACERS

CARD ALERT: 536, 702, 802, 816, 817

Plastverarbeiter v 27 n 5 May 1976 p 259-264 CODEN: PLARAN

The electrodes of a power cell are spaced by separators, which at the same time prevent particles of the active mass from growing from one lead plate to the other and thus the occurrence of short-circuits. The raw materials primarily used are impregnated cellulose and PVC. The latter is processed in the form of a fine powder without the usual auxiliaries such as stabilizers, lubricants, etc. , using a sinter method to obtain open-pore panels. Sintering takes place without pressure but with heat, employing steel belt heating tunnels specially designed for this purpose. A special grade of suspension PVC was developed for this application, which avoids the disadvantage of a previous method by which various raw materials were blended. Technological details are given along with a sketch of sintering line for PVC powders. 15 refs. In German.

ID NO.- EI761067748 667748

DER EINFLUSS DES ZINNS AUF FLIESSVERMOEGEN UND GEFUEGE UNTEREUTEKTISCHER BLEI-ANTIMON-LEGIERUNGEN. $left bracket$ Influence of Tin on Fluidity and Microstructure of Hypoeutectic Lead Antimony Alloys $right bracket$ .

Heubner, Ulrich; Rudolph, Guenther; Ueberschaer, Armin

Metallges, Frankfurt AM, Ger

DESCRIPTORS: (*LEAD ANTIMONY TIN ALLOYS*Fluidity)

CARD ALERT: 421, 534, 546

Z Metallkd v 67 n 5 May 1976 p 277-282 CODEN: ZEMTAE

The alloys investigated, containing 1, 2. 5, and 5% Sb and 0. 002 to 0. 02% Sn are used for permanent mold casting of storage battery grids. The known improvement of fluidity of hypoeutectic lead antimony alloys by addition of tin cannot be measured easily. The addition of tin influences neither grain size nor grain morphology of the solidifying alloy. Tin segregates in interdendritic and intercrystalline regions, so that more than 0. 29% Sn has been found in alloys with a mean tin content of 0. 008%. Possible effects of surface tension, viscosity, and oxygen content of the liquid alloy are discussed. At present, two different reasons for the improvement of fluidity by addition of tin can be suggested: greater strength and stiffness of the oxide skin formed at the surface of the flowing metal, and a weakening of the binding forces between the crystallites in the partly solidified metal. 21 refs. In German.

ID NO.- EI761066247 666247

DEPENDENCE OF THE PROPERTIES OF THE LEAD-ACID BATTERY POSITIVE PLATE PASTE ON THE PROCESSES OCCURRING DURING ITS PRODUCTION.

Pavlov, D.; Papazov, G.

Bulg Acad of Sci, Sofia

*ELECTROCHEMISTRYELECTRIC BATTERIES

CARD ALERT: 702, 801

J Appl Electrochem v 6 n 4 Jul 1976 p 339-345 CODEN: JAELBJ

The phase composition, microstructure, porosity, density and consistency of positive plate pastes prepared at 35 and 80 $degree$ C were determined as functions of the amount of H//2SO//4. It was found that the phase composition of the paste is determined by the H//2SO//4 oxidized lead powder ratio and by the temperature at which the paste is mixed. The paste density is determined by the liquid powder ratio. The total pore volume is controlled by the paste density while the average pore radius and the consistency are determined by the phase composition. Stoichiometric calculations were made for the phase composition of the pastes. It is concluded that the paste represents a nonequilibrium system consisting of crystalline basic lead sulphates and oxides and amorphous sulphate-containing components. 10 refs.

ID NO.- EI761065998 665998
BATTERY DEVELOPMENT IN JAPAN.
Yao, N. P.
Argonne Natl Lab, Ill
*ELECTRIC BATTERIES, SECONDARYSTORAGE BATTERY VEHICLES
CARD ALERT: 702
Symp and Workshop on Adv Battery Res and Des, Proc, Argonne, Ill, Mar 24-26 1976 Sess A p 107-128. Sponsored by Electrochem Soc, Chicago Sect, Ill, and Argonne Natl Lab, Chem Eng Div (ANL-76-8), Ill, 1976. Available from Natl Tech Inf Serv, Springfield, Va

The main thrust of battery development in Japan is toward application in electric vehicles. Development of advanced battery technology for electric vehicles has been in progress as a part of the National Electric Vehicle Research and Development Project, instituted early in 1971 by the Agency of Industrial Science and Technology, MITI, Japan. Three general types of advanced vehicle batteries are being developed under the national project: lead/acid, metal/air, and sodium/sulfur.

ID NC.- EI761065995 665995
BATTERIES FOR ELECTRIC VEHICLES IN WESTERN EUROPE.
Larder, G.; Voss, E.
VARTA Batterie, Kelkheim/Taunus, Ger
*ELECTRIC BATTERIES, SECONDARYSTORAGE BATTERY VEHICLES
CARD ALERT: 702

Symp and Workshop on Adv Battery Res and Des, Proc, Argonne, Ill, Mar 24-26 1976 Sess A p 66-80. Sponsored by Electrochem Soc, Chicago Sect, Ill, and Argonne Natl Lab, Chem Eng Div (ANL-76-8), Ill, 1976. Available from Natl Tech Inf Serv, Springfield, Va

In a variety of e. v. projects in France, Great Britain and Germany the behavior of new lead-acid batteries is evaluated. At present systems other than lead-acid are not on the road. It has been possible to increase the energy density of lead-acid cells from 25-28 Wh/kg to 30-40 Wh/kg, the life ranging from 500 to 1600 cycles. Maintenance of batteries may considerably be reduced by special peripheric installations such as automatic watering devices, cooling and proper charging methods. It is expected and partially it has already been demonstrated that these battery systems are capable of supplying sufficient power to electric vehicles for city transport. 16 refs.

ID NO.- EI761065993 665993

LEAD-ACID BATTERY.

Simon, A. C.; Caulder, S. M.

NRL, Washington, DC

*ELECTRIC BATTERIES, SECONDARYSTORAGE BATTERY VEHICLESELECTRIC ENERGY STORAGE

IDENTIFIERS: LEAD ACID BATTERY

CARD ALERT: 701, 702, 931

Symp and Workshop on Adv Battery Res and Des, Proc, Argonne, Ill, Mar 24-26 1976 Sess A p 34-48. Sponsored by Electrochem Soc, Chicago Sect, Ill, and Argonne Natl Lab, Chem Eng Div, (ANL-76-8), Ill, 1976. Available from Natl Tech Inf Serv, Springfield, Va

The lead-acid battery has shown a slow but steady development over the years of its history. Most of its improvements have been obtained through engineering development and there has been relatively little basic research. At a period when there is the possibility of two major markets for batteries, those of energy storage and electric vehicles, this battery should not be dismissed from consideration. Although at present marginal for both of these applications, there is the distinct possibility that with the proper research the life and energy density of this battery can be increased to the point where it may be more attractive than at present. Some of the problem areas and possible solutions are discussed.

ID NO.- EI761065992 665992

SECONDARY BATTERIES FOR ELECTRIC VEHICLES.

Landgrebe, Albert R.

US Energy Res & Dev Adm, Washington, DC

*ELECTRIC BATTERIES, SECONDARYSTORAGE BATTERY VEHICLES

CARD ALERT: 702

Symp and Workshop on Adv Battery Res and Des, Proc, Argonne, Ill, Mar 22-24 1976 Sess A p 19-33. Sponsored by Electrochem Soc, Chicago Sect, Ill, and Argonne Natl Lab, Chem Eng Div (ANL-76-8), Ill, 1976. Available from Natl Tech Inf Serv, Springfield, Va

Of the battery systems being developed, major efforts are presently or will be concentrated on the following seven systems: advanced lead-acid, nickel-iron, nickel-zinc, zinc-air; iron-air, lithium-metal sulfide and sodium-sulfur batteries. The probability of one or more of these systems meeting the technical requirements for the intended application within the next several years appears good. The ultimate technical/economic feasibility of these systems cannot be assessed at this time because many engineering problems must still be resolved. However, the high temperature systems, Li-MS and Na-S systems appear to be good candidates for electric vehicles in the long term. 11 refs.

ID NO.- EI761065991 665991
SECONDARY BATTERIES FOR LOAD LEVELING.
Birk, James R.; Kalhammer, Fritz R.
Electr Power Res Inst, Palo Alto, Calif
*ELECTRIC BATTERIES, SECONDARYELECTRIC ENERGY STORAGE
CARD ALERT: 701, 702, 931

Symp and Workshop on Adv Battery Res and Des, Proc, Argonne, Ill, Mar 22-24 1976 Sess A p 2-18. Sponsored by Electrochem Soc, Chicago Sect, Ill, and Argonne Natl Lab, Chem Eng Div (ANL-76-8), Ill, 1976. Available from Natl Tech Inf Serv, Springfield, Va

Discussion of the technical and cost criteria for utility energy storage. Candidate battery systems are reviewed in terms of their characteristics and basic prospects to meet utility criteria. The question of the technoeconomic feasibility of lead-acid batteries for utility energy storage are also examined. Significant technical and economic obstacles on the way to practical utility batteries are identified and related to the major ongoing development efforts. 5 refs.

ID NO.- EI761065989 665989

EFFECT OF BASE LEAD COMPOSITION ON METALLURGICAL PROPERTIES OF MAINTENANCE-FREE BATTERY ALLOYS.

Caldwell, T. W.; Sokolov, U. S.
NL Ind, Inc, Cent Res Lab, Hightstown, NJ
*ELECTRIC BATTERIESLEAD AND ALLOYS
CARD ALERT: 546, 702
J Electrochem Soc v 23 n 7 Jul 1976 p 972-977 CODEN: JESOAN

The effects of trace element additions on the microstructure and age-hardening properties of Pb-Ca and Pb-Ca-Sn alloys for maintenance-free batteries are reported. A specific laboratory casting procedure duplicating grid solidification conditions and the solidification-cast property relationships upon which it is based are discussed. It was found that bismuth, antimony, copper, and silver in amounts typical of high bismuth primary and refined secondary base leads have little or no influence on microstructure in Pb-0. 085Ca and Pb-0. 085Ca-0. 8Sn. The addition of trace elements increased the early hardness of Pb-0. 085Ca-0. 8Sn but had no effect in Pb-0. 085Ca. 23 refs.

ID NO.- EI761065988 665988

PORE VOLUME AND DENSITY OF UNFORMED PASTES OF LEAD-ACID BATTERY PLATES.

Fleischmann, C. W.: Schlotter, W. J.

C&D Batteries, Plymouth Meeting, Pa

*ELECTRIC BATTERIESLEAD COMPOUNDS

IDENTIFIERS: BATTERY PLATES

CARD ALERT: 702, 804

J Electrochem Soc v 23 n 7 Jul 1976 p 969-972 CODEN: JESCAN

The specific pore volume, v, and solids' density, d, were determined for the pastes of unformed lead-acid battery plates by a simple laboratory technique. v was found to vary linearly with the apparent density of the dry paste, D, according to v $equals$ 0. 356 $minus$ 0. 0569D for pastes cured to develop 4PbO:PbSO//4 and v $equals$ 0. 271 $minus$ 0. 0415D for pastes otherwise cured. d was determined from the relationship d** $minus$ **1 $equals$ D** $minus$ **1 $minus$ v. d decreased continually with decreasing D for all plates except those cured to develop 4PbO:PbSO//4. For the latter plates d went through a maximum as D decreased. This maximum is explained in terms of the differing crystalline perfections of the 4PbO:PbSO//4 crystals in the plates. 10 refs.

ID NO.- EI760959249     659249

X-RAY DIFFRACTION, SCANNING ELECTRON MICROSCOPY STUDY OF SEPARATOR FAILURE.

Dafler, J. R.; Garwood, A. A.; Wentzel, F. W. Jr.; Campbell, Barbara; Chu, D. I. K.

ESB Inc Technol Cent, Yardley, Pa

*ELECTRIC BATTERIES, SECONDARY

CARD ALERT: 702

J Electrochem Soc v 123 n 5 Jun 1976 p 780-789   CODEN: JESCAN

Resin-bonded paper separators suffer some loss of crystalline material on extended storage in battery grade H//2SO//4. Similar separators from cycled batteries suffer order of magnitude losses of crystallinity. Scanning electron microscopy has found Pb-salts of two kinds; those grown in regions of high and low supersaturation. The latter often obtain crystal dimensions larger than 30 $mu$ . Comparison with other separator materials used in Pb/acid batteries has led to a model of separator failure based on mechanical abrasion, fluid motion, and crystallization in large pores. The separator matrix is weakened by brittle fracture of the fiber network, accompanied by minor hydrolytic loss of material. These lead in turn to pore enlargement that can enhance the growth of large, well-ordered crystals. A somewhat speculative mechanism for perforation failure of large-pored separators is given. 32 refs.

ID NO.- EI760855650 655650

NEW SULFUR DIOXIDE-FREE PROCESS FOR RECOVERING LEAD FROM BATTERY SCRAP.

Wilson, Donald A.

College Park Metall Res Cent, Md

DESCRIPTORS: (*SCRAP METAL*Reprocessing)(AIR POLLUTIONControl)

CARD ALERT: 531, 451

US Bur Mines Rep Invest n 8123 1976, 15 p CODEN: XBMIA6

A laboratory method for processing lead battery scrap has been developed that eliminates virtually all of the SO//2 emission that normally is produced when a reverberatory or blast furnace is used. The method employs a hydrometallurgical step to convert the PbSO//4 to PbO and CaSO//4 by mixing the battery scrap with a slurry of Ca(OH)//2. The reaction is exothermic and goes to completion in 2 to 5 minutes at room temperature. The dried Product is mixed with a KCl-NaCl flux and carbon and reduced at 650 $degree$ C. A minimum charge ratio of 3 parts of carbon to 100 parts of battery scrap is required for reduction. The process produces lead reductions and recoveries as high as 97. 0 and 94. 9 percent, respectively. The KCl-NaCl flux is recovered using a standard counter-current water leach followed by evaporation. 18 refs.

ID NO.- EI760851787 651787
DIE BERECHNUNG DES STATIONAEREN UND DYNAMISCHEN ENTLADEVERHALTENS VON BLEIAKKUMULATOREN. $left bracket$ Calculation of the Discharge Behavior of Lead Batteries $right bracket$ .
Bunge, Wolfgang
*ELECTRIC BATTERIES, SECONDARY
CARD ALERT: 702
Arch Elektrotech (Berl) v 57 n 5 Dec 1975 p 235-246 CODEN: AELTA6

To calculate the terminal voltage of a lead-acid battery, which depends on the degree of discharge and on the current, the following considerations are presented: (1) the ohmic resistance, (2) the activation overvoltage, which gives a current voltage characteristic similar to that of a diode; and (3) the concentration overvoltage, which is determined by the diffusion of the electrolyte. The diffusion can be electrically modelled by pieces of Thomson cables. The equivalent circuit and the treatment of the problem are considerably simplified by regarding the stationary state to which the effect due to a superposed alternating component (load cycles) can be added. The data needed for the calculation can be determined by measurements. The conformity of the calculated and the measured behavior is good. 8 refs. In German with English abstract.

ID NO.- EI760850417 650417

MECHANICAL AND CORROSION PROPERTIES OF LOW ANTIMONY LEAD ALLOYS.

Rogatchev, T.; Ruevski, St.; Pavlov, D.

Cent Lab of Electrochem Power Sources, Bulg Acad of Sci, Sofia

DESCRIPTORS: (*ANTIMONY LEAD ALLOYS*Mechanical Properties)

CARD ALERT: 421, 546, 702

J Appl Electrochem v 6 n 1 Jan 1976 p 33-36 CODEN: JAELBJ

The mechanical properties (tensile strength, hardness, and relative elongation) of lead alloys containing 2-3% Sb, 0. 1-0. 5% Sn, and 0. 1-0. 5%As in the as-cast state and after annealing and quenching were determined. It is established that quenching significantly improves the mechanical properties of the alloys. By variation of the tin content and the thermal treatment conditions it is possible to obtain within certain limits the desired mechanical properties. The anodic dissolution c. d. of lead, and lead alloys containing 2. 2% Sb, 0. 11% As and 0. 25% Sn was determined as a function of the potential. It is found that this alloy has a higher rate of anodic dissolution and lower oxygen overvoltage than those of pure lead. These alloys are used in electric batteries. 8 refs.

ID NO.- EI760749202 649202
FLINDERS ELECTRIC VEHICLE CONCEPT.
Atkinson, D. A.; Lloyd, C. P.
Finders Univ of South Aust, Bedford Park
DESCRIPTORS: (*STORAGE BATTERY VEHICLES*Research) (ELECTRIC MOTORS, DCTraction) TORQUE CONVERTERS, HYDRAULIC
CARD ALERT: 702, 705, 632
Natl Conf Publ Inst Eng Aust n 75/8 1975, Conf on Electr Transp, Prepr of Pap, Adelaide, Aust, Oct 30-31 1975 p 54-59 CODEN: NPIEDX

An electric vehicle developed at Flinders University of South Australia is described, which uses a different approach to that used in earlier vehicles in regard to the method of power conversion and control. It employs a printed-circuit shunt-type motor at constant speed and benefits from a decrease in weight, due to more efficient use of lead-acid storage batteries. An increased vehicle range results, particularly under urban traffic conditions, and a high-efficiency regeneration is used when the vehicle is retarded. Energy is transferred to the wheels via a variable-ratio hydraulic torque converter.

ID NO.- EI760749197 649197
LUCAS ELECTRIC TAXICAB.
Anon
*STORAGE BATTERY VEHICLES(TAXICABSElectric)
CARD ALERT: 702, 662, 705
Energy Dig v 4 n 6 Dec 1975 p 39-40 CODEN: ENDGBZ

Two prototype Lucas electric taxis have been built to meet the specification of the London Metropolitan Police Public Carriage Office, from which guidance has been obtained, and they have the same excellent turning circle as present London cabs. These cabs have front-wheel drive, a top speed of approximately 55 mph, a projected range of about 100 miles on a single charge, and rapid recharging by battery exchange. The Lucas developed control system is of the SCR chopper type. Additional solid state circuitry automatically adjusts the power to the motor so it is appropriate to the driver's demand and the vehicle speed. The batteries are of the lead-acid type. The battery pack is carried in a detachable tray located under the vehicle floor. Although the pack can be charged in situ with appropriate equipment, it can also be readily exchanged for a new pack, if necessary. The 50 bhp 216-volt motor is located transversely at the front of the vehicle, level with the floor of the driving compartment.

ID NO.- EI760746894 646894

MANIPULATORFAHRZEUG-SYSTEM MF 2 UND SEINE VERWENDUNGSMOEGLICHKEITEN. $left bracket$ Manipulator Vehicle System MF 2 and Its Possibilities of Application $right bracket$ .

Koehler, Gerhard Wolfgang; Selig, Manfred

Ges fuer Kernforsch, Karlsruhe, Ger

DESCRIPTORS: (*NUCLEAR POWER PLANTS*Radiation Protection)(VEHICLES Remote Control)

CARD ALERT: 613, 622, 914, 432, 732

Kerntechnik v 17 n 12 Dec 1975 p 527-532 CODEN: KERTAA

The MF 2 is a cross-country tracked vehicle driven by electric motors supplied by lead batteries and controlled via radio from T. V. pictures. The working device is a heavy power manipulator of type SM5-D mounted on a swivel turret. The MF 2 is to be used where radioactive material or radioactively contaminated objects must be treated or removed even under conditions of difficult terrain and where high radiation levels prohibit manual action. The main data of the vehicle are presented graphically. In German and English.

ID NO.- EI760746114 646114
CORROSION OF LEAD ALLOYS AT HIGH ANODIC POTENTIALS.
Weininger, J. L.; Siwek, E. G.
GE, Corp Res & Dev, Schenectady, NY
DESCRIPTORS: (*LEAD AND ALLOYS*Corrosion)(ELECTRIC BATTERIESDesign)
CARD ALERT: 546, 702
J Electrochem Soc v 123 n 5 May 1976 p 602-606 CODEN: JESOAN

The corrosion of expanded grids of lead-antimony, lead-calcium, and lead-calcium-tin alloys maintained at constant high float charge was measured metallographically. Linear growth rates were determined for oxide growth on all three alloys. X-ray scans and maps served to locate the presence of PbSO//4 at the interfaces and in the bulk of the PbO//2 corrosion product. The results are consonant with corresponding high temperature corrosion work. This work has application to lead-acid battery design. 14 refs.

ID NO.- EI760637741 637741
KINETICS OF THE SELF-DISCHARGE REACTION IN A SEALED LEAD-ACID CELL.
Bullock, Kathryn R.; McClelland, Donald H.
Gates Rubber Co, Denver, Colo
*ELECTROCHEMISTRYELECTRIC BATTERIES, PRIMARY
CARD ALERT: 702, 801
J Electrochem Soc v 123 n 3 Mar 1976 p 327-331 CODEN: JESOAN

The kinetics and mechanism of the self-discharge reaction in a sealed lead-acid cell have been investigated. The unique cell design and the purity of the materials used produce a slower rate of self-discharge and a different mechanism than the traditional lead-acid battery. Particular attention is given to the effects of expander composition and phosphoric acid concentration on the reaction. Rates of the reaction are determined for temperatures in the range of 35 to 65 C. 23 refs.

ID NO.- EI760534961 634961
POST OFFICE TRIES LUCAS ELECTRICS.
Baker, Alan
DESCRIPTORS- (*STORAGE BATTERY VEHICLES, *Research),
IDENTIFIERS- REGENERATIVE BRAKING
CARD ALERT- 702, 901
CODEN- EUENDA SOURCE- Automot Eng (London) v 1 n 1 Oct 1975 p 54

Ten Bedford vans, with Lucas electric traction equipment in place of the standard engine/gearbox group, are being put into service by the Post Office (United Kingdom). The vehicles, based on the CF one-tonne van, are of two types $EM DASH$ one for mail collection and delivery and the other for the telecommunications engineering service. Initially the former will be operating in central London, to gain experience in dense traffic, and the latter in the Stevenage area where more rural conditions obtain. Polypropylene-case lead-acid SLI (Starting-Lighting-Ignition) batteries are used. The traction motors are rated at 37. 2 kw. The maximum level-road speed is around 89 km/hr and the acceleration from rest to 48 km/hr is quite brisk, taking about 10 seconds. A regenerative braking system is fitted as a means of extending the range and increasing the life of the wheel brakes. An interesting feature of the system is that the regeneration is in two stages. The first stage comes in on over-run, when the driver lifts completely off the accelerator, giving the equivalent retardation to engine braking. Light pressure on the brake pedal gives the second stage of regenerative braking, and heavier pressure brings in the wheel brakes. The first-stage regeneration cuts out automatically below 6. 5 km/hr to allow the vehicle to coast, the analogy here being with declutching.

ID NO.- EI7604230 99 623099
LONG-LIFE LEAD-FLUOROBORIC ACID BATTERY.
McDonald, G. D.; Weissman, E. Y.; Dettwiler, E. R.
Globe-Union Inc, Milwaukee, Wis
DESCRIPTORS- *ELECTRIC BATTERIES, PRIMARY,
IDENTIFIERS- LEAD-FLUOROBORIC ACID BATTERIES
CARD ALERT- 702
SOURCE- Power Sources Symp, 26th, Proc, Ill Inst of Technol, Chicago, Apr 29-30 and May 1-2 1974 p 120-123. Publ by PSC Publ Comm, Red Bank, NJ, 1974

It is concluded that the possibility of an extended activated life type of fluoroboric acid battery has been demonstrated in prototype batteries relying on previously developed bonded lead dioxide electrode structures. High volume, low cost production of a reproducible system is possible by an assembly sequence based on die punching, constant volume hot pressing and heat sealing. Sufficient design flexibility has been demonstrated to afford a great diversity of battery characteristis with the same tooling by appropriate variations in the number of the stock components. A reserve power source of low cost and wide temperature range is available which can be readily adapted to variety of capacity, rate and voltage requirements. 4 refs.

ID NO.- EI760423087 623087
RECENT DEVELOPMENTS IN BATTERY TECHNOLOGY.
Jones, W. R.
Chloride Tech Ltd, Manchester, Engl
DESCRIPTORS- *ELECTRIC BATTERIES, STORAGE BATTERY VEHICLES,
CARD ALERT- 702
CODEN- ELPWAQ SOURCE- Electron Power v 21 n 20 Nov 27 1975 p 1118-1121

Although the lead-acid cell still reigns over all other batteries in the electric-propulsion field, much effort is being directed to developing batteries using so-called exotic couples such as sodium-sulfur, which will give a weight advantage over the lead-acid battery and an increased range of vehicle operation.

ID NO.- EI760320610 620610
KILOWATTHOURS VS. LITERS.
Salihi, Jalal T.
Otis Elevator Co Res Cent
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Fuel Economy),
IDENTIFIERS- ENERGY CONSUMPTION
CARD ALERT- 7C2, 662
CODEN- IEESAM SOURCE- IEEE Spectrum v 12 n 3 Mar 1975 p 62-66

This article compares energy consumption for lead-acid-battey-powered electric vehicles with those of gasoline-powered vehicles. Then, the author posits a hypothetical electric car of the future that would weight 1430 kg, and depicts overall energy consumptions and efficiencies of the hypothetical electric car, along with comparable values for the baseline gasoline-powered car of the same weight and road energy. Finally, the impact of electric cars of the future on energy demand from power generating plants is discussed.

ID NO.- EI760320609 620609
BATTERY CARS TODAY $EM DASH$ SOME THEORY AND SOME PRACTICE.
Prigmore, B. J.
Imp Coll of Sci & Technol, London, Engl
DESCRIPTORS- *STORAGE BATTERY VEHICLES,
CARD ALERT- 702
CODEN- ELPWAQ SOURCE- Electron Power v 21 n 11 Jun 12 1975 p 671-673

This article reviews the current position of cars powered by conventional lead-acid batteries.

ID NO.- EI760316090 616090

WPLYW STRUKTURY MASY W ELEKTRODZIE DODATNIEJ AKUMULATORA OLOWIANEGO NA JEJ WYDAJNOSC ELEKTRYCZNA. $left bracket$ Effect of Lead Structure of the Positive Electrode of Secondary Electric Batteries on Its Electric Efficiency $right bracket$ .

Skoluda, Edmund; Dzczesniak, Barbara; Tabat, Stanislaw

Cent Lab Akumulatorow i Ogniw, Poznan, Pol

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Electrodes), (ELECTRODES, Lead and Alloys), LEAD COMPOUNDS, X-RAY ANALYSIS, MICROSCOPES, ELECTRON,

CARD ALERT- 423, 546, 702, 741, 801, 804

CODEN- PRCHAB SOURCE- Przem Chem v 54 n 11 Nov 1975 p 648-650

The structures of standard positive mass as well as that of synthetic 4PbO $multiplied by (times)$ PbO//4 were examined by means of X-ray diffraction and electron microscope. The transformation of 4PbO $multiplied by (times)$ PbSO//4 into a tetragonal variety $beta$ PbO//2 usually occurs in the metasomatic way. The positive mass of synthetic 4PbO $multiplied by (times)$ PbSO//4 is characterized by its electric capacitance being by 40-50% larger than that of standard mass. 9 refs. In Polish.

ID NO.- EI760208907 608907
CASE FOR LEAD-ACID STORAGE BATTERY PEAKING SYSTEMS.
Maskalick, N. J.; Brown, J. T.; Monito, G. A.
Westinghouse Electr Corp
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTRIC POWER SYSTEMS,
IDENTIFIERS- ENERGY STORAGE
CARD ALERT- 702, 706
SOURCE- Intersoc Energy Convers Eng Conf, 10th, Rec, Univ of Del, Newark, Aug 18-22 1975 Pap 759170 p 1135-1140. Publ by IEEE (Cat n 75CHO 983-7 TAB), New York, NY, 1975

The rapidly dwindling supplies of natural gas and fuel oil demand that electric utilities of the U. S. drastically reduce their consumption of these fuels by finding or developing substitute fuels and by improving the efficiencies of their electric power generation, storage, transmission and distribution. A variety of fuels and systems are being investigated at present, both as near-term (early 1980's) and as longer term solutions to these multifaceted problems. In the area of improved electrical energy storage, a renewed and deeper interest is being focussed on the use of electrochemical systems (batteries) as a means of storing electrical energy generated when demand is low and releasing it when demand peaks on a daily cycle. The basics of the lead-acid cell are discussed in detail, including material and fabrication costs of lead-acid peaking power battery systems. 4 refs.

ID NO.- EI760208891 608891

LEAD CHLORINE-MAGNESIUM SEA WATER BATTERIES FOR DEEP SUBMERGENCE OPERATION.

Malaspina, F. P.

ESB Inc, Yardley, Pa

DESCRIPTORS- *ELECTRIC BATTERIES, PRIMARY, UNDERSEA TECHNOLOGY,

CARD ALERT- 702, 472

SOURCE- Intersoc Energy Convers Eng Conf, 10th, Rec, Univ of Del, Newark, Aug 18-22 1975 Pap 759122 p 817-820. Publ by IEEE (Cat n 75CHO 983-7 TAB), New York, NY, 1975

The analysis of the bubble formation within a water activated battery shows that at 1,350 feet below the surface the hydrogen gas liberated from the chemical corrosion of the magnesium is completely compressed and dissolved in solution. The fluid flow through the cells of the conventional battery no longer depends on gas bubble formation, but must rely on natural convection and thermal gradients. The lead chloride-magnesium battery, using a non-pressure sensitive system, will operate independent of pressure from the surface to depths far in excess of the capability of the present sonobuoy with little electrical noise and virtually no mechanical noise below 1,350 feet. 3 refs.

ID NO.- EI760106188 606188

ELECTRICITY COUNCIL STARTS TO ASSESS THE ENFIELD 8000.

Anon

DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Miniature),

CARD ALERT- 702, 662

CODEN- EVBAAS SOURCE- Electr Veh v 61 n 3 Sep 1975 p 8-11

The Electricity Council has, during the past few months, taken delivery of 61 Enfield 8000 electric city cars. Manufactured by Enfield Automotive Ltd. , Cowes, Isle of Wight, the cars are being distributed by the Council to Electricity Boards in England and Wales, who will carry out a large scale operational research program covering the performance and use of the vehicles. Particular attention is to be paid to the effect of different charging routines and the research is expected to take about two years to complete, thus ensuring that the cars are tested under a full range of operating conditions. The Enfield 8000 is a 9 ft-4 in. long two-passenger closed car with a curb weight of 2150 lb, and a payload of 350 lb. Traction power and energy for a 600 w heater are supplied by eight 12 v lead-acid batteries of 92 amp hr capacity at the 5 hr rate, connected in parallel pairs to give 48 v maximum. An auxiliary 12 v battery (55 amp hr) supplies control circuits, lights, horn, windshield wipers, etc. A built-in battery charger enables the traction batteries to be fully recharged in eight hours from a standard domestic 13-amp socket if the discharge does not exceed 80 percent. The traction motor is 48 v, 6 kw, d-c four-pole series type, giving 8 hp at maximum speed. The maximum vehicle speed is 40 mph on the level; acceleration from 0 to 30 mph takes about 13 sec. Maximum range is about 50 mi.

ID NO.- EI760103095 603095
WASTE LEAD OXIDE TREATMENT OF LEAD ACID BATTERY MANUFACTURING WASTEWATER.
Crandall, Clifford J.; Rodenberg, Jerry R.
Marquette Univ, Milwaukee, Wis
DESCRIPTORS- (*INDUSTRIAL WASTES, *Treatment), (ELECTRIC BATTERIES, Manufacture), LEAD COMPOUNDS,
CARD ALERT- 451, 452, 453, 702, 804
CODEN- PEXSAO SOURCE- Purdue Univ Eng Bull Eng Ext Ser n 145 1974, for Meet, Purdue Univ, West Lafayette, Indiana, May 7-9 1974 pt 1 p 194-206

Composite wastewater discharges from lead-acid battery manufacturing operations are typically low in pH and contain high amounts of dissolved and suspended lead compounds, as well as sulfuric acid. The exact wastewater characteristics will vary, depending on the type of operations employed, the magnitude of these operations, the degree of in-plant recycling and reuse, and the quantity of process water used. Diagrams and tables show data. 8 refs.

ID NO.- EI7601026I8     602618
NiCd AND LEAD ACID D-SIZE CELLS MEET IN THE RECHARGEABLE ARENA.
Anon
DESCRIPTORS- (*FUEL CELLS, *Electrolytes),
CARD ALERT- 702, 802
CODEN- PRENA5   SOURCE- Prod Eng  v 46 n 11 Nov 1975 p 22-23

Sealed nickel-cadmium miniature cells have pretty much monopolized the rechargeable applications in portable calculators, tape recorders, radios, TV, hand tools and the like. Rechargeable dry cells (manganese alkaline) and miniature lead-acid batteries have not been able in the past to challenge the NiCd cells in too many major applications. However, there is a recent surge of interest in lead-acide D-cells (and X-cells). Lead acid batteries are a natural choice for economical power because the materials of construction cost less than the nickel, cadmium, and silver in competitive designs. Respective advantages of these two battery types are discussed and their performance is compared.

ID NO.- EI751280180 580180
L'ACCUMULATEUR AU PLOMB SANS ENTRETIEN. $left bracket$ Lead-Acid Batteries without Maintenance $right bracket$ .
Dailbard, Gerard; Atkins, John; Pothet, Jean; Viaud, Nicole
Cie Eur d'Accumulateurs, Fr
DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Maintenance), ( ELECTRODES, ELECTROCHEMICAL, Lead), ELECTROLYTES,
CARD ALERT- 702
CODEN- RGELAC SOURCE- Rev Gen Electr v 84 n 6 Jun 1975 p 463-472

The various aspects of maintenance of free lead-acid batteries are described: self-discharge, water consumption, gas tightness. For the positive electrode, after having specified active material composition, the authors study the influence of the proportion of lead dioxide present on the kinetics of self-discharge, as well as the degradation of the active material-grid contact as a function of the alloy used. They show that the self-discharge kinetics of the negative electrode is closely linked to that of the positive by the oxygen liberated and, for certain alloys, the presence of antimony ions. Water consumption can be reduced by increasing the hydrogen overvoltage, which leads to the use of special alloys with little or no antimony. It is possible, using an appropriate separator, to facilitate oxygen transfer to the negative and thus its reduction. The efficiency can be made 100% by increasing the cell internal pressure and using a limited quantity of electrolyte. Finally, the recombination of hydrogen and oxygen by catalysis is also mentioned. 14 refs. In French.

ID NO.- EI751177337 577337
PROGRESS ON 'VOLTMOBILES'.
Callahan, Joseph M.
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (ELECTRIC BATTERIES, SECONDARY, Charging),
CARD ALERT- 702, 662
CODEN- AUINAH SOURCE- Automot Ind v 153 n 2 Jul 15 1975 p 26-27

Two new electric passenger automobiles, based on quite different approaches, are described. The Copper Electric Town Car, developed for the Copper Development Assn, is a two-passenger hatchback weighing 2952 lb, including 1206 lb of batteries. The Transformer I is a four-passenger $left double quote$ luxury $right double quote$ car based on the Chevrolet Chevelle, weighing 5850 lb, including 2340 lb of batteries. The smaller car has a maximum speed of 55 mph, acceleration from 0 to 30 mph in 11. 8 sec; normal charging time is 8 hr. Town Car has a maximum range of 120 mi at 40 mph; its stop-and-go range is 75 mi. Eighteen 6-V lead-acid batteries are mounted on a tray which slides in from the rear of the car, occupying the central tunnel. Transformer I, developed by Electric Fuel Propulsion Corp. , is powered by an 18 v lead-cobalt battery. It has a range of 70 mi at 40 mph, 50 mi with two stops per mile. Maximum speed is 60 mph; acceleration time from 0 to 30 mph is 12 sec. Normal charging time is eight hours with 220 v, although 110 v can be used taking 48 hours for a full charge. However, an external fast charger could give the car an 80% charge in 45 to 60 minutes. A 10-minute charge would allow the car to travel 15 mi. A novel $left double quote$ accessory $right double quote$ for the larger vehicle is the availability of a mobile gasoline-powered 37. 5 Kv brushless generating set mounted on an 1860-lb trailer. This setup, though inefficient from an energy standpoint, enables the vehicle to operate where power-line charging facilities are unavailable.

ID NO.- EI751172664 572664

LEAD-ACID BATTERIES: USE OF CARBON FIBER-LEAD WIRE GRIDS AT THE POSITIVE ELECTRODE.

Weininger, J. L.; Morelock, C. R.

GE, Res & Dev Cent, Schenectady, NY

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

CODEN- JESOAN SOURCE- J Electrochem Soc v 122 n 9 Sep 1975 p 1161-1167

Conducting carbon fibers were introduced into the positive grid of the lead-acid battery in a structure which resembled a grid of pipecleaners. The carbon fibers are compatible with the environment of the positive electrode of the cell. In conjunction with Pb-Ca-Sn alloy wires or pure lead wires, the fibers prolong the cycle life of the battery, increase the high discharge rate capability, and can decrease the weight of the battery. Scanning electron microscopy showed the function of the carbon fibers to be an extension of the lead wire grid, thereby participating in the solution-precipitation mechanism of the electrode reaction. For comparison, a grid with glass fibers was also studied. 4 refs.

ID NO.- EI751070308 570308

IMPROVEMENT OF LEAD-ACID BATTERY MAINTENANCE.

Kawamoto, Hisanosuke; Shimodaira, Akira

Nippon Telegr & Teleph Public Corp, Tokyo, Jpn

DESCRIPTORS- (*TELEPHONE EQUIPMENT, *Power Supply), (ELECTRIC BATTERIES, SECONDARY, Maintenance),

IDENTIFIERS- LEAD ACID BATTERIES

CARD ALERT- 702, 718

CODEN- JTCRAN SOURCE- Jap Telecommun Rev v 17 n 2 Apr 1975 p 140-146

This paper deals with theoretical and experimental investigations of the optimum floating voltage of lead-acid batteries, a new maintenance method abolishing equalizing charges, and a field test. The new maintenance method is now applied to small-capacity exchange offices and a great saving of labor has been realized. 2 refs.

ID NO.- EI751070062 570062

LUCAS MIDI-BUS TO BE EVALUATED IN MANCHESTER.

Anon

DESCRIPTORS- *STORAGE BATTERY VEHICLES, (MOTOR BUSES, Electric Drive ),

CARD ALERT- 702, 663

CODEN- ENDGBZ SOURCE- Energy Dig v 4 n 2 Apr 1975 p 39

A 34-passenger Midi-Bus, fitted with a traction motor, sophisticated control gear and lightweight lead-acid batteries developed by the Lucas Group, traveled from Birmingham to Manchester. The bus covered the 86 miles from city center to city center via the M6 motorway at an average speed of nearly 30 mph, completing the journey in just over three hours. Total distance covered from depot to depot was 92 miles and even then the batteries were not fully discharged. The vehicle is powered by a 360 volt, d. c. motor which develops 130 bhp. This is mounted in the center of the chassis, driving the conventional back axle through a propeller shaft, the motor being controlled by a Lucas designed SCR 'chopper' controller. The controller operates by connecting and disconnecting the power source to the motor through a solid state (SCR) switch so rapidly $EM DASH$ a few hundred times a second $EM DASH$ that the motor only sees the average of the resultant 'chopped' voltage. By changing the ratio of the open to closed times of the switch, the average voltage across the motor is varied. Additional solid state circuitry automatically adjusts the power to the motor so that it is appropriate to the accelerator pedal position set by the driver and the vehicle speed. To extend the operating range of the bus, and minimize wear and tear on the mechanical brakes, a regenerative braking system is fitted. The Lucas vehicle can smoothly accelerate a full complement of passengers from 0-30 mph in under 15 seconds while a top speed of more than 45 mph will ensure that it can quietly hold its own under the worst possible traffic conditions.

ID NO.- EI751069386 569386
O TEKHNOLOGII PERERABOTKI AKKUMULYATORNOGO SVINTSA. $left bracket$ Technology for Reprocessing Battery Lead $right bracket$ .
Chumachenko, V. S.; Raskina, R. D.; Bondarenko, F. F.
DESCRIPTORS- (*SCRAP METAL, *Reprocessing), LEAD METALLURGY, ELECTRIC BATTERIES,
CARD ALERT- 531, 913, 546, 702
CODEN- TVMTAX SOURCE- Tsvet Met n 5 May 1975 p 70-74

A scheme for reprocessing battery lead scrap is proposed which includes two-stage crushing and concentration of the crushed product in vortex hydrocyclones using a self-forming heavy suspension precipitated from the initial raw material. As a result of the concentration three final products are obtained $EM DASH$ namely, a lead-antimony concentrate, which can be immediately remelted, a product consisting of lead sulfate and lead oxide, and a product consisting of organic components. In Russian.

ID NO.- EI751065423     565423
SOME PROPERTIES OF ELECTRODEPOSITED LEAD DIOXIDE.
Smith, J. F.
R Armament Res & Dev Establ, Fort Halstead, Kent, Engl
DESCRIPTORS- (*ELECTRIC BATTERIES, *Manufacture), (LEAD COMPOUNDS, Electrodeposition), NICKEL AND ALLOYS,
CARD ALERT- 702, 804, 539, 548
CODEN- TIMFA2  SOURCE- Trans Inst Met Finish v 53 pt 2 Summer 1975 p 83-88

The results of research on the adhesion of electrodeposited lead dioxide to nickel substrates and the electrical performance of this material when used as a battery plate are cited. It has been found that when lead dioxide is plated onto electrodeposited nickel prepared from a nickel chloride electrolyte adherent coatings are obtained; non-adherent coatings of lead dioxide are obtained when deposits are made on nickel substrates prepared from all other electrolytes. An explanation has been offered for this phenomenon. It has also been shown that intrinsic stress in electrodeposited lead dioxide plays an important role in its voltage performance when discharged against lead in a fluoroboric acid electrolyte.

ID NO.- EI750963244 563244

WHO NEEDS ELECTRONICS? TORQUE CONVERTERS CAN DO THE JOB.

Mangan, M. F.; Griffith, J. T.

Electr Counc Res Cent, Capenhurst, Chester, Engl

DESCRIPTORS- (*TORQUE CONVERTERS, HYDRAULIC, *Automotive Applications), (STORAGE BATTERY VEHICLES, Control),

CARD ALERT- 632, 661, 702, 432

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7466, 27 p. Sponsored by Electr Veh Counc, New York, NY, 1974

The problems associated with the development of the high powered electric road vehicle have been tackled mainly by the use of electronic controllers and compatable motors. As a technical solution to the problems, this approach has been very successful, but it has resulted in an expensive technology which is not in the usual repertoire of the automotive industry. An alternative approach using mechanical controlling elements is described which uses established automotive technology and which can be designed to give similar overall performance at a potentially lower price. Tests on an experimental van using the motor and industrial hydraulic torque converter described have shown the reliable mixed driving range to be in excess of 40 miles, with a maximum recorded range in commuter driving of 53 miles per charge with an acceleration after 25 miles of between 14 and 15 seconds for 0 to 30 mph. These results were obtained using a battery pack which gave 230 amp hr maximum from a nominal 96 V lead acid battery. These figures are not as impressive as those claimed for vehicles fitted with electronic controllers but they were achieved using standard components with a minimum of capital and development cost. Similar development devoted to improvements in torque converter couplings would substantially improve the overall efficiency and since automotive technology is directly involved, such an approach could prove more attractive to the automotive industry. 1 ref.

ID NO.- EI750962782 562782
RESEARCH FOR AN ELECTRIC CITY CAR.
Brusaglino, Giampiero
FIAT, Torino, Italy
DESCRIPTORS- (*STORAGE BATTERY VEHICLES, *Research),
CARD ALERT- 702, 431, 901
SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7415, 24 p. Sponsored by Electr Veh Counc, New York, NY, 1974

A FIAT research subject is explained, whose aim is to explore, with a deep experimental testing program, the various operating aspects and the different practical problems of a little $EM DASH$ 2 seat $EM DASH$ electric city car with original body. The experimental car described employs front-wheel drive, locates the motor and its controls in the front compartment, and locates traction and auxiliary batteries in the rear compartment. For a total weight of 900 kg, the nominal continuous power requirement is 10 kw, with 18 kw of peak power available. At present, lead-acid batteries are used. Level-road performance is 80 km/hr, and acceleration from 0-50 km/hr in 9 sec; on hills, maximum grade-ability is 20% grade, with maximum speed on 10% grade of 42 km/hr.

ID NO.- EI750962778 562778

TECHNICAL AND ECONOMIC ASPECTS CONCERNING THE APPLICATION OF THE SELF-SUPPORTING PLASTIC SANDWICH CONSTRUCTION TO ELECTRIC TRANSPORT VEHICLES.

Raschbichler, Hans Georg

Messerschmitt-Boelkow-Blohm, Ger

DESCRIPTORS- (*STORAGE BATTERY VEHICLES, *Light Weight), PLASTICS LAMINATES, PLASTICS, FOAMED, POLYURETHANES, (MOTOR TRUCKS, Electric),

CARD ALERT- 7C2, 432, 415, 817, 663

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7443, 28 p. Sponsored by Electr Veh Counc, New York, NY, 1974

Messerschmitt-Boelkow-Blohm GmbH (MBB) have developed together with the Bosch, Varta and Bayer companies an electric transport vehicle featuring a self-supporting plastic sandwich chassis and manufactured a prototype series comprising 11 such vehicles. The self-supporting plastic sandwich chassis is basically distinguished from known superstructures or body-work parts of fiberglass-reinforced plastic in that it is self-supporting, that is, absorbs all forces acting on the vehicle, whilst the FRP body-work parts merely have a shaping function. The self-supporting plastic sandwich chassis is composed of two fiberglass-reinforced plastic (FRP) shells bonded together featuring a core of polyurethane hard foam (PUR) which provides the requisite stiffness and strength. In highly stressed areas (attachment points for the wheel mounting, engine, etc. ) the FRP sheets are bonded together, or reinforcements are incorporated to increase the shearing strength of the PUR sandwich core. Automotive components are connected via metal inserts which are likewise bonded to the surface of the sheet of the chassis. In general these inserts are made of aluminum alloy; heli-coils are used for screw connections. Vehicles with a self-supporting plastic sandwich chassis show good energy absorption, so-called $left double quote$ crushing $right double quote$ , when subjected to crash tests. The good energy absorption characteristics of the sandwich structure results in defects due to accidents remaining localised at the point of damage. Thus neither the forces nor the damage are passed on to other important chassis sections. Repairing a defect occurring in a plastic chassis is extremely simple and can be effected with a suitable repair kit by unskilled workers. The vehicle is for goods transport only, for a useful load of 0. 9 tonnes; the overall weight is 3. 3 tonnes. The battery is a 72-cell, 144v, 180 amp hr, lead-acid type; the separately-excited dc motor is rated at 44 kw. 7 refs.

ID NO.- EI750962773 562773

ELECTRICAL PROPULSION SYSTEMS FOR ROAD VEHICLES. STATE OF THE ART AND PRESENT-DAY PROBLEMS.

Bader, Ch.

Dtsch Automobilges, Res Lab, Esslingen, Ger

DESCRIPTORS- *STORAGE BATTERY VEHICLES, (ELECTRIC BATTERIES, Research), FUEL CELLS,

CARD ALERT- 702, 432

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7478, 30 p. Sponsored by Electr Veh Counc, New York, NY, 1974

An analysis of various all-electric and electro-hybrid drive versions has revealed that at the moment the only possible source of energy for an electro-powered vehicle is the lead-acid battery, but that in the future alkaline and high-temperature accumulators might gain increasing importance since using these units might mean a reduction in operating cost of the vehicles thus equipped. As a result, optimization of electrical propulsion systems for road vehicles at the moment means to minimize the weight of the energy storage unit that is necessary to meet the specified transport requirements and to make the fullest possible use of the limited amount of energy available. Future developments in the field of electrical drive units should aim at cutting down the considerable cost of operation in the starting range due to the power electronic system in accordance with the comparatively short periods of operation within this range. A listing is shown (in German) of some experimental electric vehicles from various countries, some of which use internal combustion engines in a hybrid system, and others which use developmental alkaline or metal-air batteries, or fuel cells, or flywheel propulsion. 25 refs.

ID NO.- EI750962772 562772

DEVELOPMENT OF ELECTRIC VEHICLES IN JAPAN.

Smith, Gene E.

Univ of Mich, Ann Arbor

DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOTIVE ENGINEERING, Japan), (ELECTRIC BATTERIES, SECONDARY, Research),

CARD ALERT- 702, 432, 901

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7473, 14 p. Sponsored by Electr Veh Counc, New York, NY, 1974

Considerable impetus was given to the further development of electric vehicles in Japan when the decision was made to forbid gasoline powered vehicles on the site of the world exposition, Expo' 70, held in Osaka in 1970. As a result of this decision, some 320 electric cars and trucks were constructed and operated on the grounds of the Expo-70 site. This provided considerable exposure of electric vehicles to the general public and demonstrated that electric vehicles could be a viable mode of transportation to meet certain needs for moving people and materials. Perhaps the most significant impact on the future of electric vehicles in Japan was the decision by the Japanese government to establish the development of electric vehicles as a national research and development program. This program was allocated approximately 14 million dollars for the five year period 1971-75 and is being conducted under the auspices of the Agency of Industrial Science and Technology, an agency of the Ministry of International Trade and Industry. This program, described in some detail in this paper, has as its main objective the development of several classes of electric vehicles for use primarily in city-bounded transportation systems. In addition to the development of prototype vehicles, concurrent research towards developing a long-life battery with high energy density will be conducted. The types of batteries to be investigated include various constructions for lead-acid storage batteries, zinc-air batteries, iron-air batteries, and sodium-sulfur batteries. Research and development on motors and controls will be conducted in the following areas: (1) DC motor and thyristor control system; (2) Thyristor motor and power transistor control system; (3) Induction motor and inverter control system. Other laboratories and agencies will be investigating means of utilizing, popularizing and servicing and maintaining electric vehicles. Design performance specifications are given for 1973 prototypes being developed by five companies. Specifications are also given for electric buses in use in Nagoya and Osaka, and for 11 Japanese storage-battery vehicles developed outside the government-sponsored program. 6 refs.

ID NO.- EI750962769 562769
M. A. N. $EM DASH$ ELECTRO BUS PLANNING AND FIRST TESTS.
Hagen, Hans
Maschinenfabr Augsburg-Nurenberg, Munich, Ger
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (MOTOR BUSES, Electric),
CARD ALERT- 702, 432, 663
SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7460, 15 p. Sponsored by Electr Veh Counc, New York, NY, 1974

In conjunction with Bosch, Varta and RWE (Rhineland Westphalian Electricity Works), M. A. N. has developed a battery-powered electro-bus, in which the power supply unit is in an attached single-axle trailer. In this way it is possible to make the battery large enough for corresponding drive power, without limiting the useful load possibilities of the vehicle. On the basis of the plan described here, two prototypes were built and tried out in practical city service. This report deals with the results of this, and further development. The battery in the trailer is replaced at the changing station by means which can be fully automated. The buses described correspond in size to a standard diesel bus, having a permissible gross vehicle weight of 16,000 kg, overall length of 10-11 m (less trailer). The lead-acid battery of 180 cells, nominal voltage 360 v, has a 5-hr rating of 280 amp hr, and a netweight with container of 4,050 kg. Test data on both prototypes are given in detail.

ID NO.- EI750962768 562768

FEASIBILITY STUDY OF ELECTRIC BUSES FOR PUBLIC TRANSIT IN HONOLULU, HAWAII.

Hwang, H. H.; Okawa, Ronald T.

Univ of Hawaii, Honolulu

DESCRIPTORS- *STORAGE BATTERY VEHICLES, (MOTOR BUSES, Electric),

CARD ALERT- 702, 432, 663

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7459, 16 p. Sponsored by Electr Veh Counc, New York, NY, 1974

A self-propelled electric bus with a curb weight of 20,000 pounds and a seating capacity of 49 passengers appears to be technically feasible for use in Honolulu. The 4,375 pound lead-acid traction batteries currently available are capable of meeting the power requirements of such a bus, permitting it to perform comparably to the conventional bus. Limitations in driving range do exist. However, if air conditioning is not used, the bus is capable of making round trips on the shorter routes with one fully charged battery. If battery-charging stations are built such that the bus can obtain on-route battery replacements, then the bus is capable of making round trips on all routes. The majority of the routes require one battery change for a round trip when air conditioning is used. It is estimated that the electric bus needs less than one-half of the fuel required to power a conventional bus. 4 refs.

ID NO.- EI750962767 562767
U. S. POSTAL SERVICE $EM DASH$ RESEARCH AND ENGINEERING DEPARTMENT ELECTRIC VEHICLE DEVELOPMENT AND TESTING PROGRAM.
Makrides, George
US Postal Serv
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (POSTAL SERVICES, Transportation),
CARD ALERT- 702, 432
SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7439, 14 p. Sponsored by Electr Veh Counc, New York, NY, 1974

Postal routes for home and business delivery of mail and parcels are made to order for electric vehicles. Analysis of postal delivery route profiles shows that they consist of: 1. Short ranges $EM DASH$ The national average is 14 miles for 60,000 quarter-ton vehicles. 2. Moderate speeds and accelerations. 3. High rate of stops per mile with considerable idle time. Routes may have as many as 30 stops per mile, including scheduled and unscheduled stops. 4. Closed cycles $EM DASH$ Where vehicels leave and return to specified parking areas nightly and remain parked for periods of time from 15 to 18 hours. All these route conditions suit the electric vehicles' capabilities and do not stress greatly their limitations. The U. S Postal Service, Research and Engineering Department, has supported under contract the design and fabrication of three different designs of quarter-ton capacity electric vehicles. Prototype models were built in early 1973 and first tested as described here. The specifications and photographs of each vehicle are given. During the field-testing phase, the electric vehicles traveled over postal delivery routes ranging from 7 to 22 miles which included between 116 and 454 stops. Field test results of routes less than 23 miles show that in most instances the electric vehicle was capable of replacing the quarter-ton I. C. E. jeep, common to all areas of the country. With regard to operating costs, comparative data on electric vehicles and the quarter-ton jeep show anywhere from 1. 3 to 1. 94 KWH per mile, producing fuel costs of from 2. 4 to 3. 6 cents per mile at a rate of $1. 85 per KWH. Operating cost for the jeep based on 6. 65 to 7. 45 miles per gallon at 45 cents per gallon over identical routes ranged from 6. 2 to 6. 7 cents per mile. All vehicles used lead-acid batteries.

ID NO.- EI750958352 558352

NEW LEAD-ACID BATTERIES FOR ELECTRIC VEHICLES AND APPROACH TO THEIR EVALUATION METHOD.

Kamada, K.; Okazaki, I.; Takagaki, T.

Jpn Storage Battery Co, Kyoto

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Testing), STORAGE BATTERY VEHICLES,

CARD ALERT- 702, 432

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7429, 20 p. Sponsored by Electr Veh Counc, New York, NY, 1974

New lead-acid storage batteries designed for electric road-vehicle use are described, and a method of testing them which is related to the demands of the service to which they will be put is outlined. For road-vehicle service, the need for rapid and safe water replacement is provided by a new water-feeding system in which a common water line feeds all batteries via a common supply pipe when coupled to a water tank at a service depot. When not used for this purpose, the supply pipe serves as a means of exhausting battery gases to a porous ceramic filter safety venting system. From tests on storage-battery vehicles running in city traffic in Kyoto, the load patterns upon the batteries were analyzed. From these patterns it was found possible to devise a standard $left double quote$ pattern discharge $right double quote$ test for batteries for road vehicles which would more meaningfully evaluate them than the continuous discharge tests usually used. Using the new test method was found to give reasonably close indications of vehicle running range when compared with actual vehicle tests.

ID NO.- EI750958350     558350
BATTERY CHARGE CONDITION MONITORING: TECHNIQUES AND APPLICATIONS.
Christianson, Clinton C.
Gould Inc. St. Paul, Minn
DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Charging), COULOMETERS,
CARD ALERT- 702, 942
SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7469, 15 p. Sponsored by Electr Veh Counc, New York, NY, 1974

It is shown that a number of alternatives exist for accomplishing battery charge condition monitoring. The lead-acid battery is well suited to approaches based upon measurements of battery parameters where one of the most useful techniques is that incorporating an IR compensated terminal voltage. Coulometric techniques are suitable for essentially any type of battery. The most useful approaches are probably those which provide a signal proportional to the battery's charge condition. Coulometric techniques, for example, are essentially the only ones compatible with nickel-cadmium type batteries. Since coulometric techniques determine the battery recharge condition indirectly through measurement of battery charge and discharge currents, special application problems are involved in terms of maintaining synchronization between the actual battery's charge condition and that indicated by the coulometer. An accurate battery charge condition signal can be most useful in electric vehicle applications and can provide new ways for innovative system designers to solve their system application problems.

ID NO.- EI750958349 558349

EFP'S CURRENT PROGRAM.

Aronson, Robert R.

Electr Fuel Propul Corp, Detroit, Mich

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Charging), (STORAGE BATTERY VEHICLES, Research), (FUEL CELLS, Research),

IDENTIFIERS- LEAD-COBALT STORAGE BATTERIES, HYDRAZINE HYDRATE

CARD ALERT- 702, 432, 901

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Washington, DC, Feb 19-21 1974 Pap 7420, 29 p. Sponsored by Electr Veh Counc, New York, NY, 1974

A review is given of the development leading to $left double quote$ Electrosport, $right double quote$ a medium-sized American station wagon (American Motors $left double quote$ Hornet $right double quote$ of 5180 lbs curb weight) converted to storage-battery propulsion. The batteries used for tests reported in detail were a bank of 24 series-connected 6-V lead-cobalt Tri-Polar batteries developed by the author's company. The maximum speed attained was 69 mph, maximum acceleration 0. 50 mph in 26 sec, range from 56. 7 mi at 50 mph to 101. 6 mi at 20 mph. A $left double quote$ second-generation $right double quote$ Tri-Polar lead-cobalt battery is also described (U. S. Pat. 3,518,127) for which is claimed approximately 20% more energy density at high discharge rates than for the batteries used in the Electrosport and in 60 other vehicles produced over the last 7 years. At the 20-hr discharge rate, this new battery will deliver about 24 whr/lb. But at the more meaningful 100-amp discharge rate, it will deliver 18. 5 whr/lb. The 144-volt Tri-Polar lead-cobalt batteries (35. 1 kwh) can accept an initial recharging rate, when 80% or more discharged, of 45 kw (250 amp at 180 v). A feature of these batteries is their ability to accept frequent rapid recharges without damage. In a cross-country race, vehicles with these batteries traveled an average of 450 mi/day because of this recharge capability. The author briefly refers to work in progress on a Hydrazine-Air Fuel Cell which could provide a convenient source of charge built into the vehicle; its vaibility would depend on obtaining hydrazine hydrate, a byproduct of desalination, economically.

ID NO.- EI750957187     557187

INTERNATIONAL ELECTRIC VEHICLE SYMPOSIUM AND EXPOSITION, THIRD, PROCEEDINGS, 1974.

Symp

DESCRIPTORS- (*AUTOMOBILES, *Electric), (STORAGE BATTERY VEHICLES, Research), (ELECTRIC BATTERIES, Research), (FUEL CELLS, Research), ( VEHICLES, Ground Effect), ELECTRIC RAILROADS,

CARD ALERT- 662, 663, 432, 433, 702, 681

SOURCE- Int Electr Veh Symp and Expo, 3rd, Proc, Pap, Washington, DC, Feb 19-21 1974 Sponsored by Electr Veh Counc, New York, NY, 1974

These volumes include 68 technical papers, most of which discuss various aspects of electric propulsion of city-type vehicles, their fields of application, technical requirements and limitations, servicing, power sources, and marketability. Understandably, most of the power supply discussion relates to the lead-acid battery, but developments including lead-cobalt, lithium-sulfur, zinc-air and zinc-chloride batteries, and even fuel cells are reported. Motors (both ac and dc) and electronic controls for them are discussed. A description of work toward flywheel propulsion is included. Railroads are also considered in several papers; these include all-electric propulsion and both tracked air-cushion and tracked magnetically levitated developments. Experience of the U. S. Postal Service with jeep-size electric trucks is reported. An electric taxicab system running in a special lane (with third-rail power supply) is proposed for the city of New York. Prototypes of a bicycle and a three-wheel light truck, both storage-battery vehicles, are described. Forty-three individual papers are indexed separately.

ID NO.- EI750853027 553027
LOW-RATE CATHODIC LINEAR SWEEP VOLTAMMETRY (LSV) STUDIES ON ANODIZED LEAD.
Sharpe, Thomas F.
GM, Warren, Mich
DESCRIPTORS- (*LEAD AND ALLOYS, *Corrosion), ELECTRIC BATTERIES, SECONDARY, (ELECTRODES, ELECTROCHEMICAL, Lead and Alloys),
CARD ALERT- 539, 546, 702
CODEN- JESOAN SOURCE- J Electrochem Soc v 122 n 7 Jul 1975 p 845-851

The sweeps were supplemented by current-time traces obtained during the short term anodic treatment above the PbO//2/PbSO//4 reversible potential in H//2SO//4 electrolytes. Despite complications from additional substrate corrosion during the sweeps, semiquantitative observations were possible and the cathodic discharge could be resolved into $alpha$ - and $beta$ -PbO//2 components. A major finding was that antimony in the lead retards the formation of $beta$ -PbO//2 in the preliminary anodic treatment. Implications from the results with regard to the behavior of the Pb-acid battery positive plate are briefly discussed. 17 refs.

ID NO.- EI750849749 549749

EVALUATION OF THE USE OF BIOLOGICAL INDICATORS IN AN ATMOSPHERIC LEAD SURVEY.

Ratcliffe, J. M.

Univ of Manchester, Engl

DESCRIPTORS- (*AIR POLLUTION, *Analysis), ATMOSPHERIC COMPOSITION, (ELECTRIC BATTERIES, Manufacture),

IDENTIFIERS- ATMOSPHERIC LEAD

CARD ALERT- 443, 451, 702, 801

CODEN- ATENBP SOURCE- Atmos Environ v 9 n 6-7 Jun-Jul 1975 p 623-629

Atomospheric lead deposition was monitored in the vicinity of a battery factory by an integrated survey of lead levels in indigenous moss and grass samples and by a short-term study of weekly increments in lead deposition at selected sites around the source using the mossbag technique. A significant correlation between the lead content in indigenous mosses and grass can be demonstrated, and the lead levels closely reflect the proximity to the source and the long-term wind pattern. 21 refs.

ID NO.- EI750748709 548709

REVIEW OF MARKET PROSPECTS FOR BATTERY ELECTRIC ROAD VEHICLES $EM DASH$ 1.

Waters, M. H. L.; Porter, J.

DESCRIPTORS- *STORAGE BATTERY VEHICLES, ELECTRIC BATTERIES, VEHICLES, TECHNOLOGY FORECASTING,

IDENTIFIERS- BATTERY ELECTRIC ROAD VEHICLES

CARD ALERT- 432, 702, 901, 922

CODEN- TRRLA6 SOURCE- Transp Road Res Lab (GB) TRRL Rep LR 630 1974, 31 p

A review of the market prospects for battery electric versions of light goods vehicle, urban bus, and private car has been made based on the development of improved batteries. Three particular battery types could have twice, five times and ten times the energy density of present lead/acid traction batteries. Conclusions are that the best prospects are for the light goods vehicle and urban bus application. 22 refs.

ID NO.- EI750746651 546651
LUCAS BUS IS ON EVALUATION TRIALS.
Anon
DESCRIPTORS- (*MOTOR BUSES, *Electric), STORAGE BATTERY VEHICLES,
CARD ALERT- 663, 705, 702, 432
CODEN- EVBAAS SOURCE- Elec Veh v 61 n 1 Mar 1975 p 3-6

The first electric bus in regular daily service in an English city went into operation in Manchester on 28th February 1975. Using a sophisticated lead-acid battery developed by Lucas (Batteries) Ltd. , the bus has been described as having a performance comparable to a diesel vehicle and is said to have done journies of over 100 miles on one battery charge during trial runs. The bus is a 34-passenger midi-bus with a composite light alloy, glass fiber body. Powered by a 360-volt d. c. motor, which develops 130 brake horsepower, mounted in the center of the chassis, a propeller shaft drives the conventional back axle; the motor is controlled by a Lucas designed SCR $left double quote$ chopper $right double quote$ located at the rear of the bus. Additional solid state circuitry automatically adjusts the power to the motor so that it is appropriate to the accelerator pedal position set by the driver and the vehicle speed. The Lucas bus with a full complement of passengers can accelerate smoothly from 0 to 30 mph in under 15 seconds, while a top speed of more than 45 mph is available.

ID NO.- EI750745972 545972
DEFORMATSIONNOE UPROCHNENIE SPLAVOV Pb-Sb. $left bracket$ Strain Hardening of Pb-Sb Alloys $right bracket$ .
Bolotovskii, V. I.; Bolotovskii, N. I.; Gallai, Ya. S.; Gordyakova, G. N.; Dasoyan, M. A.
DESCRIPTORS- *LEAD ANTIMONY ALLOYS, (METAL FORMING, Cold Working),
CARD ALERT- 535, 546
CODEN- TVMTAX SOURCE- Tsvet Met n 2 Feb 1975 p 62-64

A study is made of the effect of rolling on the mechanical properties of lead-antimony alloys containing 1 to 7% Sb and up to 0.2% As. Area reductions of up to 30% can be used to increase product strength, while large area reductions of 40 to 80% reduce the degree of hardening of the product. By using strain hardening, it is possible to reduce the degree of alloying of battery alloys and save costly antimony. In Russian.

ID NO.- EI750744158 544158
MATEMATICHESKOE MODELIROVANIE SVINTSOVO-KISLOTNYKH AKKUMULYATOROV. $left bracket$ Mathematical Modeling of Lead-Acid Batteries $right bracket$ .
Gerasimenko, Yu. Ya.; Kukoz, F. I.; Sinel'nikov, E. M.; Lyubiev, O. N.; Goncharov, V. I.
DESCRIPTORS- (*ELECTRIC BATTERIES, *Mathematical Models),
CARD ALERT- 702
CODEN- IVUZA9 SOURCE- Izv Vyssh Uchebn Zaved Elektromekh n 3 1975 p 250-258
The mathematical model of a lead accumulator is obtained as a set of equations of the electric and concentration fields. The model is utilized for the calculation of voltage and current of the accumulator during its discharge in different operating conditions. In Russian.

ID NO.- EI750641574 541574
BATTERY CHARGE CONDITION MONITORING
Christianson, Clinton C.
Gould Inc
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Electric), ELECTRIC BATTERIES, SECONDARY, (AIR POLLUTION, Control),
CARD ALERT- 702, 662, 705, 451
CODEN- SEPPA8 SOURCE- SAE Prepr n 740728 for Meet Sep 9-12 1974, 7 p

Basic techniques are presented for determining the charge condition of electric vehicle propulsion batteries of both the lead-acid and nickel-cadmium types. The techniques presented include those employing measurement of battery parameters, such as electrolyte properties, voltage, and internal resistance, and those utilizing coulometric measurements. An application example employing the coulometric approach is described to demonstrate the usefulness of an accurate battery charge condition signal in an automated material handling car system. 10 refs.

ID NO.- EI750531517 531517
DIE KORNFEINUNG VON UNTEREUTEKTISCHEN BLEI-ANTIMON-GUSSWERKSTOFFEN MIT KUPFER UND SCHWEFEL. $left bracket$ Grain Refinement of Hypoeutectic Lead Antimony Casting Alloys by Additions of Copper and Sulfur $right bracket$ .
Huebner, Ulrich; Mueller, Ingrid; Ueberschaer, Armin
Metallges, Frankfurt AM, Ger
DESCRIPTORS- (*LEAD ANTIMONY ALLOYS, *Castings), (ELECTRIC BATTERIES , Manufacture),
CARD ALERT- 534, 546, 702
CODEN- ZEMTAE SOURCE- Z Metallkd v 66 n 2 Feb 1975 p 74-79

The favorable effect of grain refinement on the hot tearing tendency of lead antimony castings, such as battery grids, was investigated on the Pb-2. 5Sb alloy. Experimental data show that copper additions up to 0. 1% cause grain refinement, the maximum effect being reached with 0. 04%. The effect of sulfur is greater than that of copper, but the best results are obtained with Cu $plus$ S. Copper addition causes Cu//2Sb formation, sulfur addition causes PbS formation, and combined Cu and S addition may result in CuSbS//2 or Cu//2S formation. Cu//2Sb as well as PbS may act as nucleants during the solidification of lead-antimony alloys. It is possible however, that the grain refinement is the result of growth retardation. 18 refs. In German.

ID NO.- EI750530055 530055
BATTERY TECHNOLOGY. PACKAGING MORE MUSCLE INTO LESS SPACE.
Lyman, Jerry
DESCRIPTORS- *ELECTRIC BATTERIES,
CARD ALERT- 702
CODEN- ELECAD SOURCE- Electronics v 48 n 7 Apr 3 1975 p 75-82

The appeal of low-power electronic equipment is being enhanced by new primary and secondary cells, which perform better and are packaged more simply than older power sources. New primary and secondary cells made of lithium, zinc-chloride, divalent silver-oxide, silver-cadmium, and silver-zinc, as well as gelled and 'starved' lead-acid electrochemicals provide more power per pound, longer shelf life, higher performance over a longer temperature range, and better packaging. Inexpensive primary batteries suffice for many small electronic products, such as portable radios, calculators, and watches. However, at higher prices, rechargeable batteries eliminate the inconvenience of battery changing or provide reliable standby power for equipment, such as volatile computer memories, which would otherwise lose their effectiveness if the line power failed.

ID NO.- EI750528921 528921

EFFECTS OF OCCUPATIONAL EXPOSURE TO INORGANIC LEAD ON NEUROMUSCULAR FUNCTIONING.

Repko, John D.; Nicholson, John A.; Morgan, Ben B. Jr.

Univ of Louisville, Ky

DESCRIPTORS- *BIOMEDICAL ENGINEERING, (PERSONNEL, Health), OCCUPATIONAL DISEASES,

CARD ALERT- 461, 912, 914

SOURCE- Hum Factors Soc, Annu Meet, 18th, Proc, Huntsville, Ala, Oct 15-17 1974 p 209-218. Publ by Hum Factors Soc, Santa Monica, Calif, 1974

Uncertainty concerning the maximum allowable exposure levels exists, because clear relationships among exposure levels, biochemical effects, and behavioral effects of lead have not yet been established. In view of this, an investigation was conducted of the behavioral effects of Occupational Exposure to lead. The experimental subjects were volunteers from among workers exposed to inorganic lead at their jobs in three storage (lead-acid) battery manufacturing companies; the controls were volunteers from companies involved in other various types of light manufacturing. The results of these analyses suggest that functional capacity decreased in terms of tremor and eye-hand coordination but increased in terms of muscular strength. In addition, the data suggest that these changes occur on the preferred side and at blood-lead levels between 70 and 79 micrograms per cent. 16 refs.

ID NO.- EI750528810 528810
BATTERIES: PROSPECTS FOR ELECTRIC VEHICLES.
Brooman, Eric W.; Clifford, John E.; Semones, Donald E.
Battelle Columbus Lab, Ohio
DESCRIPTORS- (*AUTOMOBILES, *Electric), STORAGE BATTERY VEHICLES, ELECTRIC BATTERIES, SECONDARY, (AIR POLLUTION, Control),
CARD ALERT- 705, 622, 702, 415
CODEN- AUEGBB SOURCE- Automot Eng v 83 n 1 Jan 1975 p 30-35

A battery with both high specific power and with high specific energy is impossible to manufacture. Therefore, hybrid systems are often employed in storage battery vehicles. These use batteries with high specific power to give higher speeds and a second battery with high specific energy to give better range. The authors discuss alternatives to the lead-acid battery.

ID NO.- EI750427353 527353
ELECTRIC BUSES OPERATE SCHEDULED SERVICES.
Anon
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (MOTOR BUSES, Electric Drive ),
CARD ALERT- 702, 432, 705
CODEN- EVBAAS SOURCE- Elec Veh v 60 n 4 Dec 1974 p 12-13

In Germany, the world's first full-schedule commercial electric bus service opened in Moenchengladbach on October 15 and in Dusseldorf on November 4. In the former city there are seven buses in operation on a 25 mile route, while in Dusseldorf there are 13 buses working two routes, also of 25 miles. With an unladen weight of 7. 7 tonnes and a pay load of 8. 3 tonnes, the buses have seats for 33 passengers and standing room for a further 66. They have a maximum speed of just over 40 mph and, in ordinary traffic operation, a range of 50 miles on one battery charge. The batteries are carried behind the bus on a specially designed trailer and are changed over at the terminus in four minutes. Although based on the traditional electrochemical principle (i. e. : lead-acid) the new batteries have very little in common with the conventional automotive battery. They use special thermostatically-controlled cell-cooling for higher performance and longer life and incorporate new ideas to produce a higher power-to-weight ratio, quicker charging and easier handling.

ID NO.- EI750424633 524633

DIE VERHUETTUNG VON BLEIERZ UND AKKUMULATORENSCHROTT NACH DEM BBU-RUNDHERDVERFAHREN. $left bracket$ Smelting of Lead Ore and of Electric-Batteries Scrap Metal by Means of the BBU Circular Hearth Furnace $right bracket$ .

Dlaska, Herbert

Bergwerks-Union, Arnoldstein, Austria

DESCRIPTORS- (*LEAD AND ALLOYS, *Scrap), (SCRAP METAL, Reprocessing), (LEAD ORE TREATMENT, Smelting),

IDENTIFIERS- ELECTRIC BATTERIES SCRAP

CARD ALERT- 531, 533, 546

CODEN- ERZMAK SOURCE- Erzmetall v 28 n 1 Jan 1975 p 6-12

Circular hearth furnace developed by the Bleiwerks-Union AG (BBU) of Austria in connection with their roasting technique can be used economically also by small lead smelters. The technique, however, requires at least 70% of sulfidic concentrates in the charge. The method can be also used for reprocessing lead scrap metal such as electric batteries. In German.

ID NO.- EI750422999 522999

MICROSTRUCTURAL CONTROL IN LEAD ALLOYS FOR STORAGE BATTERY APPLICATION.

Perkins, Jeff; Edwards, G. R.

Nav Postgrad Sch, Monterey, Calif

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Manufacture),

CARD ALERT- 702

CODEN- JMTSAS SOURCE- J Mater Sci v 10 n 1 Jan 1975 p 136-158

The role of alloying and thermomechanical processing in direct microstructural control in lead-base storage battery alloys is reviewed. Strength, corrosion, and electrochemical correlations are discussed for conventional and emerging lead alloy systems. 78 refs.

ID NO.- EI750422998 522998

RECOMMENDED PRACTICE FOR INSTALLATION DESIGN AND INSTALLATION OF LARGE STATIONARY GENERATING STATION AND SUBSTATION LEAD STORAGE BATTERIES.

Comm Rep

DESCRIPTORS- *ELECTRIC BATTERIES, NUCLEAR POWER PLANTS, ELECTRIC SUBSTATIONS,

CARD ALERT- 613, 702, 706

CODEN- IEPSA9 SOURCE- IEEE Trans Power Appar Syst v PAS-93 n 4 Jul-Aug 1974 p 1105-1109

This document presents pertinent information regarding recommended design for and practices concerning the location, mounting, preparation and installation of large stationary lead storage batteries, including special requirements for nuclear power generating stations. This document was affirmatively balloted by Station Design Subcommittee of Power Generation Committee, SC-4 working group of NPEC and other representatives of the industry for presentation as $left double quote$ work in progress $right double quote$ . As a result of this ballot, several concerns in the area of qualification became evident. After consideration of these concerns and additional comments from the industry, this document was revised and will be submitted to IEEE Standards as a recommended practice.

ID NO.- EI750422996 522996

RECHERCHES ET DEVELOPPEMENT DANS LE DOMAINE DES ACCUMULATEURS. $left bracket$ Research and Development in the Field of Batteries $right bracket$ .

Cook, Albert R.

Int Lead Zinc Res Organ, Inc

DESCRIPTORS- *ELECTRIC BATTERIES, (AUTOMOBILES, Electric),

CARD ALERT- 662, 702, 705

CODEN- MATCBW SOURCE- Mater Tech v 62 n 11 Nov 1974 p 459-465

The currently available electric batteries for propulsion of vehicles are critically examined, and some new types of future batteries suitable for this purpose are discussed. The features of future electric vehicles are outlined. 14 refs. In French.

ID NO.- EI750422995     522995

BATTERIES DE DEMARRAGE AU PLOMB $EM DASH$ UNE PROGRESSION CONSTANTE VERS LES ACCUMULATEURS SANS ENTRETIEN. $left bracket$ Starting Lead Batteries: A Constant Progress Toward Service-Free Batteries $right bracket$ .

Wilmotte, F.

Cent de Rech Le Nickel-Penarroya-Mokta

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- MATCBW   SOURCE- Mater Tech  v 62 n 11 Nov 1974 p 455-458

The current status of development in the field of automobile starting lead batteries is described in detail and the additional improvements and features which will presumably characterize the battery of tomorrow are discussed. 7 refs. In French.

ID NO.- EI750422994 522994

APPLICATIONS ACTUELLES ET AVENIR DE L'ACCUMULATEUR AU PLOMB. $left bracket$ Current and Future Applications of Lead Batteries $right bracket$ .

Lasserre, Pierre

Cie Eur d'Accumulateurs, Fr

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- MATCBW SOURCE- Mater Tech v 62 n 11 Nov 1974 p 451-454

A review is presented of the current status of development and future prospects of three types of electric lead batteries $EM DASH$ i. e. , starting batteries for thermal engines, traction batteries for electric vehicles, and stationary batteries used for various purposes, such as for auxiliary signalization installations, emergency or security purposes, etc. In French.

ID NO.- EI750315868 515868

ACCELERATED LIFE TESTING OF LEAD-ACID INDUSTRIAL MOTIVE POWER CELLS.

Maskalick, N. J.

Westinghouse Res Lab, Pittsburgh, Pa

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

CODEN- JESOAN SOURCE- J Electrochem Soc v 122 n 1 Jan 1975 p 19-25

Depth of positive grid corrosion is a regular and precise indicator of cell degradation during life testing of the subject lead-acid cells. Average corrosion depth at constant temperature is directly proportional to (time on cycle test)**0**. **6**7 for Pb-5% Sb positive grids. The temperature dependence of the logarithm of the corrosion rate constant is employed to predict a room-temperature corrosion function. Lifetime at room temperature is then estimated to a predefined average depth of corrosion corresponding to actual failure in normal service. This test is capable of high precision predictions of cell lifetime in a period of 4-6 months, compared to 3-4 years in conventional testing. 7 refs.

ID NO.- EI750209051 509051

THERMAL DECOMPOSITION MECHANISM OF FORMED AND CYCLED LEAD DIOXIDE ELECTRODES AND ITS RELATIONSHIP TO CAPACITY LOSS AND BATTERY FAILURE.

Caulder, S. M.; Simon, A. C.

Int Lead Zinc Res Organ Res Assoc, Nav Res Lab, Washington, DC

DESCRIPTORS- (*ELECTRODES, ELECTROCHEMICAL, *Lead Compounds), ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 539, 702, 804

CODEN- JESOAN SOURCE- J Electrochem Soc v 121 n 12 Dec 1974 p 1546-1551

The structural changes accompanying capacity loss in the PbO//2/PbSO//4 electrode were followed using differential thermal analysis. The thermal decomposition mechanism of formed plates was found to differ, depending on the method of manufacture. All cycled plates, however, gave the same decomposition mechanism after a few cycles. The major changes in the DTA curves, as the positive electrode was cycled to failure, was the gradual disappearance of the exothermic peak at 200 C and the endothermic peak at 358 C. It is believed that these peaks are associated with an electrochemically active amorphous form of PbO//2. As the electrochemically active PbO//2 is cycled to failure it is converted to an electrochemically inactive form of PbO//2. This latter form of PbO//2 gives DTA results similar to those obtained on reagent PbO//2. The continual conversion of electrochemically active PbO//2 to the electrochemically inactive PbO//2 is one of the major factors that accounts for the loss in battery capacity and ultimate failure. 17 refs.

ID NO.- EI750209049 509049
EVALUATION OF EXPANDERS USED IN THE NEGATIVE LEAD BATTERY ELECTRODE.
Abdul Azim, A. A.; Ismail, A. A.
Natl Res Cent, Dokki, Cairo, ARE
DESCRIPTORS- (*ELECTRODES, ELECTROCHEMICAL, *Lead and Alloys), ELECTRIC BATTERIES, SECONDARY,
CARD ALERT- 539, 546, 702
CODEN- JAELBJ SOURCE- J Appl Electrochem v 4 n 4 Nov 1974 p 351-356

A method for studying the influence of expanders on the capacity of a thin layer of porous lead cathode is described. Acetylene black, BaSO//4, lignin, humic acid and two sorts of wood flour have been used. The mode of change of capacity and hydrogen evolution potential during cycling and the mean and initial capacities may be utilized for the characterization of the type of expander. The experiments show clearly that BaSO//4 crystals have an influence on the nucleation whereas the organic expander affects the growth of PbSO//4. Acetylene black increases the conductivity of the mixture. 17 refs.

ID NO.- EI750208997 508997

ENERGY CONSERVATION IN ELECTRIC VEHICLES: THE D. C. DISC-ARMATURE MOTOR.

Campbell, Peter

Univ of Cambridge, Engl

DESCRIPTORS- *ELECTRIC TRACTION, (AUTOMOBILES, Electric), STORAGE BATTERY VEHICLES,

CARD ALERT- 662, 702, 705

CODEN- ELPWAQ SOURCE- Electron Power v 20 n 15 Sep 5 1974 p 634-636

During the last decade, a considerable amount of effort has been put into the development of electric vehicles. Most of this has been concerned with lead-acid batteries and alternative energy sources. However, the design of the remaining propulsion system components could be leading to an unnecessarily poor vehicle performance. It is probable that there would be significant advantages if the motor and transmission were reconsidered. This solution is to design the motor, not only to improve its own efficiency, but to allow the transmission to be reduced to an epicyclic gearbox. The latter has been shown to be of greater importance. One possible alternative that has already been investigated is an in-wheel motor design. This machine, known as the disk-armature motor, has an axial field produced by high coercivity permanent magnets, and an armature from any ferromagnetic material. The armature disk therefore has the active conductors running radially and would be encapsulated in epoxy resin for mechanical strength. The lack of both iron losses and power to produce the magnetic field means that this machine can be designed to operate at higher efficiencies than conventional series-wound machines. However, the prime concern has been shown to be the reduction of transmission-power losses. The design of the disk-armature motor is such that it has an inherently high power/weight ratio. The iron-free armature reduces the coil inductance to a negligible value, raising the speed limit that is normally imposed by the occurrence of undercommutation. The wheel-motor unit thus has to include a gearbox and an epicyclic unit is chosen for its high efficiency. The matching of a high motor speed to this gearbox requires the use of nylon planet gears and air cooling. There has to be a compromise between the size and weight of the motor and those of the gearbox to achieve minimum overall weight. This is then low enough for the unit to be included as part of the unsprung weight.

ID NO.- EI750208654 508654
POLYMER-BONDED NEGATIVE ELECTRODES FOR LEAD-ACID BATTERIES.
Weininger, J. L.; Secor, F. W.
GE, Corp Res and Dev, Schenectady, NY
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, (ELECTRODES, ELECTROCHEMICAL, Lead and Alloys),
IDENTIFIERS- POLYMER BONDING
CARD ALERT- 546, 702
CODEN- JESOAN SOURCE- J Electrochem Soc v 121 n 12 Dec 1974 p 1541-1545

Negative lead electrodes were pasted and bonded to lead alloy substrates with activated carbon and a polymer. Scanning electron microscopy was used to follow structural changes of the polymer-bonded electrodes during cycle life. With lead-calcium alloy substrates the electrode performance of the polymer-bonded electrode was superior to conventionally pasted electrodes with respect to cycle life, charge acceptance, and lack of gassing. Different substrates of the same Pb-0. 06%Ca-1%Sn alloy gave similar results. 5 refs.

ID NO.- EI750207762 507762

EFFECTS OF CALCIUM, TIN, AND BISMUTH ON THE EARLY STRENGTH OF CALCIUM-LEAD ALLOYS.

Myers, M.; Van Handle, H. R.; DiMartini, C. R.

Am Smelting and Refin Co, South Plainfield, NJ

DESCRIPTORS- *CALCIUM LEAD ALLOYS,

CARD ALERT- 546, 549

CODEN- JESOAN SOURCE- J Electrochem Soc v 121 n 11 Nov 1974 p 1526-1530

Over the last several years, interest in calcium-lead alloys for use as grids in SLI batteries has greatly increased due to the expected requirement for maintenance-free (low gassing) batteries in the automotive industry. The effects of calcium content as well as additions of tin and bismuth on the mechanical properties of calcium-lead alloys have been investigated. THe alloys were wrought and heat-treated in order to avoid the problems raised by the presence of casting variables. The previously reported increase in the rate of hardening with increasing calcium content was confirmed. Binary alloys containing less than 0. 04% calcium showed no strengthening 1 hr after quench from the solution treatment temperature while 0. 1% calcium nearly doubled in tensile strength in only 5 min. Tin, in additions of 0. 5 and 1%, completely restrained hardening in the first hour after quench in both 0. 06 and 0. 1% calcium alloy. Bismuth additions were made up to 1000 ppm. No effect was noted on the early strength of the 0. 1% calcium alloys, but the rate of hardening of the 0. 06% calcium alloys was significantly enhanced by the presence of bismuth. These findings show that early strength of calcium-lead alloys may be improved by: (1) limiting tin content; (2) increasing calcium content; or (3) adding bismuth to lower calcium alloys. 9 refs.

ID NO.- EI750106226 506226

CHARACTERISTICS OF LEAD ACID AND SILVER-ZINC BATTERIES IN THE DEEP OCEAN ENVIRONMENT.

Berju, K. K.; Daniels, E. L.; Strohlein, E. M.

E. S. B. Inc, Philadelphia, Pa

DESCRIPTORS- (*SUBMERSIBLES, *Electric Power Supplies), ELECTRIC BATTERIES,

CARD ALERT- 472, 674, 702

SOURCE- Mar Electrochem, Symp, Proc, Pap, 142nd Meet of Electrochem Soc, Miami Beach, Fla, Oct 8-13 1972 p 166-178. Publ by Electrochem Soc, Inc, Princeton, NJ, 1973

Power supply systems for instrumentation and life support of oceanographic submersibles are outlined. Studies of the charge/discharge characteristics, material compatibility and hardware development of pressure compensated batteries for the deep ocean environment are examined. A comparison of the power densities and related performance criteria of the lead and silver batteries is reviewed.

ID NO.- EI750104361 504361
BIG CHANGE IN PRODUCT CALLS FOR INNOVATIVE CUSHIONING, PACKAGING.
Ostrander, Harold L.
West Electr Co, Springfield, NJ
DESCRIPTORS- (*PACKAGING MATERIALS, *Plastics), PLASTICS, FOAMED, POLYSTYRENES, PRODUCT DESIGN, (ELECTRIC BATTERIES, Packaging),
CARD ALERT- 601, 694, 702, 817
CODEN- PKEGA3 SOURCE- Package Eng v 19 n 10 1974 p 60-63

This paper reports on work performed by Western Electric Company to develop a suitable package for a new round lead-acid storage battery for telephone central offices. Configuration study was followed by materials testing with particular attention to shock resistance. PS foam was selected and used for field trials. In all these tests scrutiny revealed batteries intact. This package has demonstrated its reliability. 4 refs.

ID NO.- EI750104235 504235

HIGH CAPACITY SALT WATER BATTERIES UTILIZING FUSION-CAST LEAD AND CUPROUS CHLORIDE CATHODES.

Gray, T. J.; Wojtowicz, J.

Atl Ind Res Inst, Halifax, NS

DESCRIPTORS- (*OCEANOGRAPHY, *Instruments), ELECTRIC BATTERIES,

CARD ALERT- 471, 702, 942

SOURCE- Mar Electrochem, Symp, Proc, Pap, 142nd Meet of Electrochem Soc, Miami Beach, Fla, Oct 8-13 1972 p 141-165. Publ by Electrochem Soc, Inc, Princeton, NJ, 1973

An attempt was made to design a battery with inexpensive cathodic materials. Medium- and high-capacity salt water batteries have been constructed utilizing either magnesium or aluminum alloy anodes against PbCl//2:Cu//2Cl//2 cathodes. Electrodes of excellent mechanical strength with cast-in current collection screens are fabricated by fusion casting. Sustained performance at 20-50 A/ft**2 at 1. 0-0. 85 volts has been obtained with better than 90% cathodic efficiency. Fundamental properties are analyzed against composition, porosity, build-up of metal at the cathode and nature of the anode over the temperature range 0-25 $degree$ C. 3 refs.

ID NO.- EI750102192     502192

OSCILLOPOLAROGRAPHIC STUDY OF THE BEHAVIOR OF CADMIUM AND LEAD IONS IN THIN LAYERS OF SOLUTIONS ON PLATINUM ELECTRODES.

Lyalikov, Yu. S.; Tyurin, R. S.; Bul'maga, K. P.; Meryan, V. T.
Inst of Chem, Acad of Sci of the Moldavian SSR, Kishinev

DESCRIPTORS- *ELECTRODES, ELECTROCHEMICAL, OSCILLOGRAPHS, IONS,
IDENTIFIERS- PLATINUM ELECTRODES
CARD ALERT- 539, 702, 942
CODEN- INDLAP   SOURCE- Ind Lab (USSR)   v 40 n 4 Apr 1974 p 448-451

The method of oscillopolarography was used with a linearly varying voltage to study the behavior of cadmium and lead ions on platinum electrodes. An oscillopolarograph of the TsLA-03 type was employed with a sawtooth voltage sweep. Solutions of cadmium and lead were prepared by dissolving cadmium chloride and lead acetate of the chemically-pure class in twice-distilled water. The investigation was carried out in a thin-walled cell, using a micrometer (MK-75) to establish the required thickness of the solution. 9 refs.

ID NO.- EI750101670 501670

HYDROMETALLURGISCHE VERARBEITUNG ABFALLENDER BLEIAKKUMULATORPASTEN UNTER VERWENDUNG VON AETHYLENDIAMIN. $left bracket$ Hydrometallurgical Treatment of Waste Lead Storage Battery Pastes, Using Ethylene Diamine $right bracket$ .

Nikolov, T.; Liakov, N.

DESCRIPTORS- (*ELECTRIC BATTERIES, *Waste Utilization), LEAD METALLURGY,

IDENTIFIERS- HYDROMETALLURGY

CARD ALERT- 531, 546, 702, 913

CODEN- NEUHAM SOURCE- Neue Huette v 19 n 10 Oct 1974 p 591-594

The pastes under consideration contained 79 to 84% Pb, mainly in the form of oxides. An analysis showed 70 to 72% oxide, 1. 6 to 1. 8% sulfate, 2. 5 to 3. 0% sulfide, and 7. 5 to 9. 6% metal. Leaching of these pastes without or after H//2SO//4 treatment, carbonization of the amine solutions, and the production of lead monoxide and red lead of high quality are described. In German.

ID NO.- EI750101669 501669
SELECTING A STANDBY BATTERY.
Ohntrup, Frederick F.
Eltra Co, Plymouth Meeting, Pa
DESCRIPTORS- (*ELECTRIC BATTERIES, *Maintenance),
CARD ALERT- 702, 913
CODEN- PLENAV SOURCE- Plant Eng (Barrington, Ill) v 28 n 22 Oct 31 1974 p 65-67

Lead-calcium batteries require the addition of only about one-tenth of water of equivalent lead-antimony batteries; this consumption remains constant over the life of the battery. Lead-calcium batteries will normally require water at about 3 to 5 year intervals, but it is not unusual to find installations where watering is required only every 10 years.

ID NO.- EI741278171 478171

ENTWICKLUNG ANTIMONARMER BLEILEGIERUNGEN FUER STARTERBATTERIEGITTER. $left bracket$ Development of Low Antimony Lead Alloys for Starter Battery Grids $right bracket$ .

Borchers, H.; Nijhawan, S. C.; Scharfenberger, W.

Tech Univ, Munich, Ger

DESCRIPTORS- (*LEAD ANTIMONY ALLOYS, *Mechanical Properties), ELECTRIC BATTERIES, LEAD METALLOGRAPHY,

CARD ALERT- 531, 546, 702

CODEN- MTLLAF SOURCE- Metall v 28 n 9 Sep 1974 p 863-867

The applicability in starter grids of lead alloys containing 3. 5 to 1. 6% Sb rather than 5 to 8% was investigated. It was found that decreasing Sb decreases mechanical strength. However, more than sufficient strength can be restored by simple age hardening, i. e. , by faster cooling after solidification, or solution annealing and quenching, and by arsenic addition. Increasing tendency for coarse-grain formation with decrease in Sb content, solidification cracks and other casting defects which decrease the ductility of the starter grids, can be eliminated by selenium grain-refining additions. Additions of tin improve mold-filling capacity. Micrographs and plotted properties are given. In German.

ID NO.- EI741276866 476866

48V, 40A RECTIFIER UNIT FOR SIEMENS ESK 3000 E CROSSPOINT TELEPHONE EXCHANGES.

Ponzer, Franz; Schierer, Guenter

DESCRIPTORS- *ELECTRIC RECTIFIERS, TELEPHONE EQUIPMENT, TELEPHONE EXCHANGES, AUTOMATIC,

CARD ALERT- 715, 718

CODEN- SZTEA6 SOURCE- Siemens Rev v 41 n 7 Jul 1974 p 331-334

A 40 A thyristor-controlled rectifier unit, which can be connected directly between the mains and the telephone exchange or in parallel with a 25-cell lead-acid battery as a standby unit, has been specially developed for ESK exchanges. All the ancillary equipment required for monitoring, protection and alarm signaling in both modes is incorporated. The unit is accommodated in a cabinet, which need not be located in the same room as the ESK switching equipment.

ID NO.- EI741276552 476552
MORE POWER FOR THE BATTERY.
Ford, Eric
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,
CARD ALERT- 702
CODEN- ELEMA9 SOURCE- Electr Eng (Melb) v 51 n 7 Jul 1974 p 30-31

Technological advances in storage batteries and some applications are reported. Advances in lead-acid batteries are pointed out. A mobile emergency powerpack based on nickel-cadmium batteries is described. 6 refs.

ID NO.- EI741173815 473815
CHLORIDE UNVEILS THE $left double quote$ SILENT RIDER $right double quote$ .
Anon
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (MOTOR BUSES, Electric), ( ELECTRIC BATTERIES, SECONDARY, Charging),
CARD ALERT- 702, 432, 663, 705
CODEN- EVBAAS SOURCE- Elec Veh v 60 n 1 Mar 1974 p 4-7

A battery-powered single-deck, 50-passenger city-type bus called $left double quote$ Silent Rider $right double quote$ was exhibited at a London press conference March 5, 1974. It was expected to start commercial operation in Manchester in April. The bus was built by Chloride Technical Ltd. in cooperation with SELNEC (South-East Lancashire and North-East Cheshire Transport Authority). Silent Rider has a start/stop service range up to 40 mi on one battery charge, top speed of 40 mph, level-road acceleration of 3. 3 ft/sec**2, and has climbed a 1-in-6 grade on fully charged batteries. A tubular 330 v lead-acid battery of 165 cells provides motive power. A specially developed charger can fully recharge this battery in 3. 5 hr or boost-charge it at 1% of battery capacity every minute up to 75% of capacity. Surveys conducted by SELNEC have shown central-city buses to average 8. 5 mph during rush hours, up to 45% of such buses are utilized less than 7 hr/day, 50% of them during rush hours average less than 25 mi/run, with 40% more covering no more than 40 mi. Silent Rider with batteries and charger will cost about 150% of similar diesel bus, but should save on operating costs.

ID NO.- EI741169250 469250

BATTERY POWER FOR ELECTRIC VEHICLES $EM DASH$ 2. NOVEL HIGH ENERGY POWER SOURCES.

Barak, M.

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Research), STORAGE BATTERY VEHICLES, (AUTOMOBILES, Electric),

CARD ALERT- 702, 901, 662, 663, 705

CODEN- EVBAAS SOURCE- Elec Veh v 60 n 1 Mar 1974 p 12-18

A review is presented of development work on some of the more unusual types of rechargeable batteries which have been considered as energy sources for electric vehicles. Among the types discussed are: silver oxide-zinc cells, fuel cells, zinc-oxygen (or air) cells iron-air cells, sodium-sulfur cells, lithium-chlorine cells; zinc-chlorine batteries. The costs and technical problems of each of these systems are reported; for the present, none of these offers practical competition to the lead-acid storage battery for vehicle traction. A chart is given which shows the best estimates of the power-energy relationships of most of the power sources described, and based on these estimates, their capabilities (regardless of cost) of meeting the requirements of an electric automobile. Of the systems described, the author concludes that the sodium-sulfur battery shows the greatest promise, but that much work is still needed to prove its commercial viability.

ID NO.- EI741169248     469248
IMPACT OF ADVANCED BATTERIES ON ELECTRIC POWER GENERATION.
Douglas, David L.
Gould Inc, Mendota Heights, Minn
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTRIC POWER PLANT EQUIPMENT, STORAGE BATTERY VEHICLES,
IDENTIFIERS- ELECTRIC LOAD LEVELING
CARD ALERT- 702
SOURCE- Energy Dev, IEEE Power Eng Soc Pap p 37-41. Available from IEEE (74 CH0913-4-PWR), New York, 1974

Electric street vehicles and storage of off-peak electrical energy for use in periods of peak demand are two potentially important new markets for secondary batteries. Today's battery technology, best exemplified by the lead-acid battery, cannot meet the requirements of either application. New battery systems under development promise performance and cost which will satisfy the needs of both, although succcessful accomplishment is five to ten years away. The implications for the electric utility industry are discussed. 14 refs.

ID NO.- EI741169243 469243

BATTERY SYSTEMS FOR PEAKING POWER GENERATION.

Brown, Jack T.; Cronin, John H.

Westinghouse Electr Corp

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

SOURCE- Intersoc Energy Convers Eng Conf, 9th, Proc, Pap, San Francisco, Calif, Aug 26-30 1974 Pap 749139, p 903-910. Available from ASME, New York, 1974

The concept of batteries as an energy storage device for peaking electrical generation is one in which each potential application dictates whether the economics, and system application is in fact competitive with pumped hydro or other peaking generation. It is envisaged that plants with battery banks storing hundreds of megawatt-hours would be located at distribution sub-station sites. A program is underway whose objective is to use new construction technology lead-acid batteries with long life and low cost as the key components which will enable the concept to be economically preferable for a large segment of the peak power requirements on electric utility systems in this decade. The discusses three topics: utility system load variation, with emphasis on peaking generation, an economic comparison of various peaking generation alternatives, the concept and status of an advanced technology lead-acid battery. 7 refs.

ID NO.- EI741169228 469228

SURVEY OF THERMAL BATTERY DESIGNS AND THEIR PERFORMANCE CHARACTERISTICS.

Tepper, F.

Catal Res Corp, Baltimore, Md

DESCRIPTORS- *ELECTRIC BATTERIES, PRIMARY,

CARD ALERT- 702

SOURCE- Intersoc Energy Convers Eng Conf, 9th, Proc, San Francisco, Calif, Aug 26-30 1974 Pap 749061, p 671-677. Available from ASME, New York, 1974

Thermal battery designs and their performance characteristics are reviewed. The chemistry of lithium chloride-potassium chloride eutectic is discussed relevant to its use as a thermal battery electrolyte. A description is given of those cell designs most often used in thermal battery production. Cup cells, open cells and pellet cells are compared with respect to their performance in production batteries. Thermal, silver-zinc, and lead fluoboric acid primary ordnance batteries are compared with respect to performance, reliability, temperature stability and cost. 7 refs.

ID NO.- EI741167833 467833
PACKEN, SORTIEREN UND BEREITSTELLEN AUF STETIGFOERDERERN. $left bracket$ Packing, Sorting and Preparing for Shipment by Means of Continuous Conveyors $right bracket$ .
Salzer, Joerg
Salzer, Offenbach, Ger
DESCRIPTORS- (*AUTOMOBILES, *Accessories), (MATERIALS HANDLING, Warehouses), CONVEYORS,
CARD ALERT- 662, 691, 692, 694
CODEN- FOHBAN SOURCE- Foerdern Heben v 24 n 7 May 1974 p 676-680

Based on the consideration that should lead to a development of the right concept of materials-flow, paper discusses guidelines for planned materials-flow systems. As a case-in-point planning and operation of a central warehouse in a plant manufacturing automobile parts and accessories are described. System is using conveyors (horizontal and vertical), automatic paletting and storage battery vehicles. 3 refs. In German.

ID NO.- EI741063767 463767
COPPER RECYCLING NEED NOT POLLUTE.
Anon
DESCRIPTORS- (*METALS AND ALLOYS, *Recovery), SCRAP METAL,
CARD ALERT- 531
CODEN- IRAGAN SOURCE- Iron Age v 214 n 2 Jul 8 1974 p 60

A recycling furnace, consisting of a fire-brick primary combustion chamber in a metal house, an afterburner and a stack with a water scrubber, can recover copper from wire at a cost of 1 $one-half$ -cents a pound. The furnaces can also be used to recover aluminum from wire and castings, lead from cable sheathing and old storage batteries and silver from electronic circuit boards and films.

ID NO.- EI740954476 454476

EXPANDER ACTION IN THE LEAD-ACID BATTERY $EM DASH$ 2. THE INHIBITION OF NUCLEATION PROCESSES.

Brennan, M. P. J.; Hampson, N. A.

Univ of Technol, Loughborough, Leics, Engl

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Charging),

CARD ALERT- 702

CODEN- JEIEBC SOURCE- J Electroanal Chem Interfacial Electrochem v 52 n 1 Apr 25 1974 p 1-10

An analysis has been made of the nucleation and growth process operating in the reduction of passivating PbSO//4 films, and the electrocrystallization of lead from lead perchlorate solutions. A typical organic additive for lead-acid batteries, Totanin FNA, has been found to suppress the overall reaction in both cases, and further evidence is presented to show a specific suppression of the nucleation step in Pb electrocrystallization. The technological implications of the results are discussed with reference to the well-known fact that expanders produce an enhancement of the cycle life of lead-acid battery negatives. 16 refs.

ID NO.- EI740849483 449483

PHASE COMPOSITION OF ELECTRODE PASTES IN LEAD STORAGE BATTERIES.

Rusin, A. I.; Dasoyan, M. A.

DESCRIPTORS- (*LIQUIDS, *Phase Equilibria), SOLIDS, LEADS AND ALLOYS, SULFURIC ACID, WATER, ELECTRIC BATTERIES,

CARD ALERT- 444, 546, 702, 804, 931

CODEN- JAPUAW SOURCE- J Appl Chem USSR v 46 n 12 Part 1 Dec 1973 p 2799-2802

This paper is concerned with the thermodynamic analysis of equilibria in the system Pb-H//2SO//4-H//2O which shows that the phase composition of electrode pastes made by mixing of sulfuric acid, water, and highly oxidized lead powder is complex and depends on the preparation conditions. Parameters such as bulk density and contents of metallic lead, lead sulfate, lead oxide, and water, used for assessment of pastes in production, do not reflect the true phase composition. The influence of various technological factors on the phase composition and processes accompanying past production was examined in the reported investigation. One of the main factors determining the phase composition of electrode pastes is the component ratio in the formulation. The data presented in this contribution are based mostly on bibliographical information. The rates of particular processes are influenced significantly by the structure of PbO. 21 refs.

ID NO.- EI740845958 445958

FABRIC FILTER PLANTS FOR CLEANING GASES FROM NON-FERROUS METAL FURNACES.

Squires, B. J.

Tilghman Weelabrator Ltd, Altrincham, Chester, Engl

DESCRIPTORS- *AIR FILTERS, FLUE GASES, FURNACES, MELTING, DUST ABATEMENT,

CARD ALERT- 451, 521, 532, 534

CODEN- FSEPAA SOURCE- Filtr Sep v 11 n 3 May-Jun 1974 p 277-288

Alternative fabric systems are discussed and actual industrial applications are described by six filter installations in the non-ferrous metals industry, including copper alloy manufacture, scrap battery melting, secondary smelting of aluminum, secondary smelting of copper and brass, primary lead smelting and primary aluminum smelting.

ID NO.- EI740740367     440367
BATTERIES $EM DASH$ 3. A COMPARISON OF COST, MAINTENANCE, AND LIFE TRADEOFFS.
Reither, E. Wayne
Chloride Syst (USA) Inc, North Haven, Conn
DESCRIPTORS- (*ELECTRIC LIGHTING, *Emergency Lighting), FUEL CELLS,
CARD ALERT- 707, 702
CODEN- LGDAAA   SOURCE- Light Des Appl v 4 n 5 May 1974 p 26-27

Cost, maintenance and operating life tradeoffs are compared for nickel-cadmium, lead calcium and lead antimony of various types. The cost of purchasing and operating these emergency lighting batteries is also compared in chart form.

ID NO.- EI740740365 440365
BATTERIES $EM DASH$ 1. THE VIRTUES OF NICKEL-CADMIUM.
Wilson, R.
Nife Inc, Copiague, NY
DESCRIPTORS- (*ELECTRIC LIGHTING, *Emergency Lighting), ILLUMINATING ENGINEERING, FUEL CELLS,
CARD ALERT- 707, 702
CODEN- LGDAAA SOURCE- Light Des Appl v 4 n 5 May 1974 p 23-24

The types most commonly used for emergency lighting systems include the gelled electrolyte cells and wet lead-acid and nickel-cadmium types. All are rechargeable and are available in various sizes and capacities. Battery types are compared in terms of expected performance life, time between water additions and available capacity after one year of storage. Watt output of five classes of nickel-cadmium cells are also shown in chart form.

ID NO.- EI740740361 440361
WHAT'S AVAILABLE.
Cusano, Arnold J.
Dual-Lite Co, Newtown, Conn
DESCRIPTORS- (*ELECTRIC LIGHTING, *Emergency Lighting), ILLUMINATING ENGINEERING,
CARD ALERT- 707
CODEN- LGDAAA SOURCE- Light Des Appl v 4 n 5 May 1974 p 6-8

The trend is away from the tackle-box look. Battery-operated systems, particularly inverter units, offer the installation owner new options. A typical emergency system consists of a fully automatic, solid-state charger, lead or nickel-cadmium battery, a dc to ac static inverter, and a transfer relay. The standard equipment normally powered by utility output immediately switches over to the emergency ac system when normal ac power fails.

ID NO.- EI740638117 438117
ELEKTRISCHE ANTRIEBE FUER STRASSENFAHRZEUGE, ENTWICKLUNGSSTAND UND AKTUELLE PROBLEME. $left bracket$ Electric Propulsion for Road Vehicles, State of the Art and Problems $right bracket$ .
Bader, Christian; Plust, Heinz G.
Dtsch Automobilges, Hannover, Ger
DESCRIPTORS- (*VEHICLES, *Electric Drive),
CARD ALERT- 432, 705
CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 94 n 11 Nov 1973 p 637-645

An analysis of various all-electric and electro-hybrid drive versions has revealed that at the moment the only posible source of energy for electro-powered vehicles is the lead-acid battery, but that in the future also alkaline and high-temperature accumulators might gain increasing importance since using these units might mean a reduction in operating costs of the vehicles thus equipped. As a result, optimization of electrical propulsion systems for road vehicles at the moment means to minimize the weight of the energy storage unit that is necessary to meet the specified transport requirements and to make the fullest possible use of the limited amount of energy available. Future developments in the field of electrical drive units should aim at cutting down the considerable cost of operation in the starting range due to the power electronic system in accordance with the comparatively short periods of operation within this range. 22 refs. In German.

ID NO.- EI740638115 438115
BEITRAG ZUR THEORIE DES ELEKTROMOBILS. $left bracket$ Contribution to the Theory of the Electric Vehicle $right bracket$ .
Walz, Alfred
Tech Univ, Berlin, Ger
DESCRIPTORS- (*VEHICLES, *Electric Drive),
CARD ALERT- 432, 705
CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 94 n 11 Nov 1973 p 622-631

The theory of a wheeled vehicle $EM DASH$ whether with electric or conventional drive $EM DASH$ can be dealt with sufficiently accurately on the basis of classical mechanics, when we are discussing drive $left double quote$ on wheels $right double quote$ from the points of view of forces, powers and mechanical energies. With the electric vehicle, by reason of the very low energy from the energy stores nowadays available (the lead accumulator) questions of the energy conversion efficiency in the chain $left double quote$ battery drive $right double quote$ are of great importance. Up to the requirement $left double quote$ at the wheels $right double quote$ exact calculations are possible for any actual drive programs. Characteristic examples are given. For the energy losses in the battery and in the drive empirical laws must be introduced, but these are satisfactory. With analytical interpolations for these laws in combination with the $left double quote$ mechanics of the vehicle $right double quote$ it is possible to establish a semi-empirical theory of the electric vehicle. This theory answers in a simple analytical form optimization questions for an electric vehicle, for example the weight of the battery, the maximum range or the transport effort, and it can therefore prove useful for the designer of electric vehicles. 14 refs. In German.

ID NO.- EI740637555 437555
UNIVERSITY OF FLORIDA SOLAR ELECTRIC CAR.
Schaeper, Herbert R. A.
Univ of Fla, Gainesville
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Electric), (ELECTRIC POWER GENERATION, Solar Energy), AIR ENGINES, (ELECTRIC BATTERIES, SECONDARY, Charging), (ELECTRIC MOTORS, DC, Traction),
CARD ALERT- 662, 702, 705, 615, 641
SOURCE- IEEE Southeast-Con, Proc, Reg 3 Conf, Louisville, Ky, Apr 30-May 2 1973 Pap A-1, 5 p. Publ by IEEE (73 CHO725-2 REG III), New York, 197

This vehicle is driven by a separately excited dc motor with solid-state field control. This arrangement makes regenerative braking practical. Propulsive power is supplied by a lead-acid, four-unit, 12 v storage battery. Field excitation is provided by 30 nickel-cadmium cells. Electricity to charge these batteries is supplied either by the 110 v utility power line or by indirect conversion from solar energy. The solar electric system uses parabolic collectors to intercept sunshine to heat a collector which in turn heats air to operate Sterling cycle air engines which drive electric generators. The electric car is driven in regular city traffic 32 kilometers on the average every work day. Each test run is approximately 8 kilometers, after which the batteries are recharged to restrict them to shallow cycling. The maximum speed is 97 kilometers per hour on a level road with a tire pressure of 3 atmospheres. At a speed of 40 kilometers per hour the car will travel a distance of 88 kilometers. 15 refs.

ID NO.- EI740633245 433245

EFFECT OF ADDITIVES ON THE REACTION MECHANISM OF THE Pb/PbSO//4 ELECTRODE.

Simon, A. C.; Caulder, S. M.; Gurlusky, P. J.; Pierson, J. R.

Nav Res Lab, Washington, DC

DESCRIPTORS- *ELECTRODES, ELECTROCHEMICAL, LIGNIN, (ELECTRODES, Lead Compounds), (ELECTRIC BATTERIES, Secondary),

IDENTIFIERS- ELECTRODE MORPHOLOGY

CARD ALERT- 702, 804, 811

CODEN- JESOAN SOURCE- J Electrochem Soc v 121 n 4 Apr 1974 p 463-467

An investigation was made of the effect of lignin and BaSO//4 on the capacity and life of the negative plate. BaSO//4 alone, lignin alone, and combinations of the two improved cycle life. Of the combinations tested, 0. 5% BaSO//4 and 1. 0% lignin gave the greatest improvement on SAE cycle life tests. Lignin alone was as effective as the lignin-BaSO//4 combination in high-rate, low-temperature discharges. Lignin decreased the diameter of the lead particles and passivated portions of the lead surface, so that lead sulfate crystal growth was away from the surface, leaving considerable open space in the mass of crystals at the end of discharge. Without lignin the lead particles were larger, more closely spaced, and lead sulfate grew solidly along the lead surfaces, so that there was little void space at the end of charge. Microscopic examination showed nothing to explain the beneficial effect of BaSO//4. 13 refs.

ID NO.- EI740632854 432854

ROLE OF ANTIMONY IN THE LEAD-ACID BATTERY $EM DASH$ 1. THE EFFECT OF ANTIMONY ON THE ANODIC BEHAVIOUR OF LEAD.

Brennan, M. P. J.; Stirrup, B. N.; Hampson, N. A.

Univ of Technol, Loughborough, Leics, Engl

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTROCHEMISTRY, LEAD AND ALLOYS, ANTIMONY AND ALLOYS,

CARD ALERT- 546, 702, 801

CODEN- JAELBJ SOURCE- J Appl Electrochem v 4 n 1 Feb 1974 p 49-52

Linear sweep voltammetric (LSV) and impedance studies of lead/antimony binary alloys (0-12% Sb) are described. The formation of a solid antimony-containing species in close contact with a passivating layer of lead sulphate at sufficiently positive potentials (before lead dioxide formation) is indicated. In the presence of antimony, changes in the characteristics of the passivating layer occur, in accordance with a reduction in thickness and an increase in porosity. 8 refs.

ID NO.- EI740632853 432853
DISCHARGE CAPACITY OF THE LEAD-LEAD DIOXIDE COUPLE IN FLUOBORIC AND HYDROFLUOSILICIC ACID.

Hampson, N. A.; Bushrod, C. J.

Univ of Technol, Loughborough, Leics, Engl

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTRODES, ELECTROCHEMICAL, ELECTROLYTES,

CARD ALERT- 702, 803, 804

CODEN- JAELBJ SOURCE- J Appl Electrochem v 4 n 1 Feb 1974 p 1-6

Results of an investigation of the behavior of primary cells, based on the PbO//2/Pb couple operating in lead dissolving acids, are presented. Specifically fluoboric and fluosilicic acids have been examined in detail and the results compared with established data from perchloric acid based systems. As expected, the performances of the fluoridic electrolytes were somewhat inferior: however some interesting observations are reported, namely the occurrence of maxima in concentration/performance curves and the detailed form of these curves. The characteristics do not depend on the electrode/electrolyte balance within the cell. Theories are advanced to account for the observed behavior. 3 refs.

ID NO.- EI740632852 432852

AUTOMATIC CHARGING OF LEAD ACID BATTERIES USING SILICON CONTROLLED RECTIFIERS.

Manoharan, L. C.

Natl Aeronaut Lab, Bangalore, India

DESCRIPTORS- (*ELECTRIC BATTERIES, *Charging),

CARD ALERT- 702

CODEN- IJELA2 SOURCE- Int J Electron v 36 n 2 Feb 1974 p 231-238

The paper deals with a taper cum trickle charger which automatically adjusts the charging current proportional to the AH of discharge of the battery. The unique feature of the charger is that the SCR is phase controlled and, unlike other chargers using UJT and SCR, this is not an ON-OFF charger but a proportional charger. Refs.

ID NO.- EI740632851     432851

PHYSIKALISCHE GRENZEN HEUTIGER SPEICHERBATTERIEN UND CHANCEN FUER DIE ENTWICKLUNG NEUER SYSTEME. $left bracket$ Limitations of Present Storage Batteries and the Chances of Developing New Systems $right bracket$ .

Niklas, Hans; Berndt, Dietrich

Varta Batterie, Kelkheim, Ger

DESCRIPTORS- *ELECTRIC BATTERIES, STORAGE BATTERY VEHICLES,

CARD ALERT- 702

CODEN- EKZAA3   SOURCE- Elektrotech Z Ausg A  v 94 n 11 Nov 1973 p 694-699

The different aspects for the special development of batteries for electric vehicles are discussed. It is shown for the lead acid accumulator, how the energy density given by the electrochemical reaction, is reduced by several parameters, which are necessary for producing a working battery. The possibility of future improvements is discussed. The considerations which are given for the lead acid battery can be applied to all the other electrochemical systems. For high temperature systems additional difficulties are to be expected, because thermal isolation of the system is necessary. 14 refs. In German.

ID NO.- EI740631464 431464

KRITISCHE BETRACHTUNGEN ZUR EINORDNUNG VON ELEKTRISCH ANGETRIEBENEN NUTZFAHRZEUGEN IN DEN GROSSTAEDTISCHEN STRASSENVERKEHR. $left bracket$ Critical Considerations of Integrating Electricity Driven Commercial Vehicles with City Traffic $right bracket$ .

Albrecht, Helmut; von Scarpatetti, Diether

Daimler-Benz, Stuttgart, Ger

DESCRIPTORS- (*AUTOMOBILES, *Electric Drive),

CARD ALERT- 663, 705

CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 94 n 11 Nov 1973 p 661-665

The air pollution in areas of high population density could demand new developments in goods and personal transport in the future. Electrically powered vehicles with different kinds of energy supply $EM DASH$ depending on the kind of transport required can be performed $EM DASH$ from the technical point of view, as examples produced by Daimler-Benz AG for specific operating conditions show. The extra cost compared with diesel engine powered vehicles, mainly caused by the expensive lead acid batteries with their low energy density, is the decisive argument against the general use of electrically powered vehicles. 9 refs. In German.

ID NO.- EI740631462 431462
ANOTHER CHANCE FOR ELECTRICS?
Gottesman, Carl A.; Pond, James B.
DESCRIPTORS- (*AUTOMOBILES, *Electric), FUEL ECONOMY, STORAGE BATTERY VEHICLES,
CARD ALERT- 662, 521, 702
CODEN- AUINAH SOURCE- Automot Ind v 150 n 8 Apr 15 1974 p 29-34

Recent developments with electric cars (and buses) are explored; one design offers speeds of up to 70 miles per hour with a range of 120 miles. Research work will concentrate on nickel-iron or nickel-zinc batteries, which offer improved energy and power density as compared with lead-acid batteries. Zinc-chloride batteries are another candidate and only five years from production. Other topics covered are the use of solar energy for partial recharging, improved insulation and heat recovery techniques for car heating and compatible transmission and braking system designs.

ID NO.- EI740525965 425965

CONTROL BATTERIES (LEAD-ACID) PAST, PRESENT AND FUTURE PREDICTIONS.

Lindrose, C. W. Jr.

Gould, Inc, Cleveland, Ohio

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

SOURCE- IEEE Pet and Chem Ind Conf, 20th, Annu, Conf Rec, Houston, Tex, Sep 10-12 1973 Pap 73-11, p 89-93. Available from IEEE (73CHO769-01A), New York, 1973

The data presented includes a historical review of lead-acid control bbatteries, vintage 1882 through the present state of the art, and predictions for the future. General care and operating procedures and selection of battery types for float and cycle service are discussed.

ID NO.- EI740420488 420488

STUDIE UEBER DIE VERARBEITUNG VON BLEIAKKUMULATORENSCHROTT DURCH SCHMELZEN MIT ANTIMONTRISULFID. $left bracket$ Investigation of Lead Storage Batteries Scrap Processing by Melting with Antimony Trisulfide $right bracket$ .

Cengel, Juraj

Banska Stiavnica, Horna Huta, Czech

DESCRIPTORS- (*LEAD AND ALLOYS, *Scrap), ELECTRIC BATTERIES, (SCRAP METAL, Reprocessing),

CARD ALERT- 531, 546, 702, 913

CODEN- ERZMAK SOURCE- Erzmetall v 26 n 8 Aug 1973 p 385-388

Thermodynamical investigations have shown the feasibility of title process for recovery of antimonial lead. Industrial application of the process requires maintaining the partial pressures pSO//2 $plus$ pS//2 in the furnace's atmosphere; at operating temperatures in the range between 850 and 900 C this value should be lower than 10** $minus$ **5 atm. 9 refs. In German.

ID NO.- EI740420487 420487

LE TRAITEMENT METALLURGIQUE DES ACCUMULATEURS AU PLOMB USES. $left bracket$ Metallurgical Treatment of Used Lead Batteries $right bracket$ .

Melin, Albert

Stolberg Ingenieurberatung, Allemagne, Ger

DESCRIPTORS- (*LEAD AND ALLOYS, *Scrap), (FOUNDRIES, Scrap Reclamation),

CARD ALERT- 531, 534, 546

CODEN- MTLGAY SOURCE- Metallurgie v 13 n 3 1973 p 106-110

A review is given of the methods currently used for metallurgical treatment of lead battery scrap with the aim to recover maximum lead-antimony alloys from the bath and then to separate lead from antimony. 3 refs. In French.

ID NO.- EI740312530     412530

STANDARD ELECTRODE POTENTIAL MEASUREMENTS OF Pb/PbCl//2/HCl AND Tl/TlCl/HCl HALF CELLS IN DIMETHYLFORMAMIDE AT 30 C.

Bates, Frank Leslie; Nee, Yeu Tsang

Univ of Detroit, Mich

DESCRIPTORS- *ELECTRODES, ELECTROCHEMICAL, ELECTROCHEMISTRY,

CARD ALERT- 539, 702, 801

CODEN- JESOAN   SOURCE- J Electrochem Soc v 121 n 1 Jan 1974 p 79-82

The potentials of electrodes consisting of metal, solid metal chloride, and a solution of a soluble chloride (anhydrous HCl) in dimethylformamide (DMF) have been measured vs. a hydrogen electrode as the reference electrode. Half cells Pb/PbCl//2/HCl and Tl/TlCl/HCl were prepared by contacting pure metal with its associated chloride after forming the solid phase in a glass tube. Elaborate and scrupulous procedure is important for preparing the hydrogen electrode to attain reliable and reproducible measurements in DMF. Standard electrode potentials of $minus$ 0. 3368 and $minus$ 0. 5994V vs. SHE in DMF, at 30 C, were attained in DMF for the lead chloride and thallium chloride electrodes, respectively, at 30 C. 13 refs.

ID NO.- EI740312211 412211
RAPID CHARGING OF LEAD ACID BATTERIES.
Gross, S.
Boeing Co, Seattle, Wash
DESCRIPTORS- (*ELECTRIC BATTERIES, *Charging), STORAGE BATTERY VEHICLES,
CARD ALERT- 702
SOURCE- IEEE Ind Appl Soc, Annu Meet, 8th, Conf Rec, Pap, Milwaukee, Wis, Oct 8-11 1973 p 905-912. Publ by IEEE (73 CHO 763-31A), New York, 1973

Lead-acid batteries are the most popular type for today's electric vehicles, and will continue this domination for the immediate future. With the present lead-acid technology, electric vehicles can obtain a range on the order of 50 miles. This will satisfy driving needs most of the time, but occasionally it will be desirable to extend the range for long trips. If the batteries could be recharged quickly in one or more stops along the highway, that would provide the desired range extension. This summary reviews the problems of charging lead-acid batteries quickly, considers the theoretical limitations, describes existing methods and new approaches for fast charge, and points out the most promising approaches. 29 refs.

ID NO.- EI740312210 412210

SOME ASPECTS OF GAS RECOMBINATION IN LEAD-ACID SYSTEMS.

Mahato, B. K.; Weissman, E. Y.; Laird, E. C.

Globe-Union Inc, Milwaukee, Wis

DESCRIPTORS- *ELECTRIC BATTERIES, LEAD AND ALLOYS, ELECTRODES, ELECTROCHEMICAL,

IDENTIFIERS- LEAD-ACID BATTERIES

CARD ALERT- 546, 702

CODEN- JESOAN SOURCE- J Electrochem Soc v 121 n 1 Jan 1974 p 13-16

It is shown that in a structurally controlled lead-acid cell the electrodes, in addition to their electrochemical function, also provide evolved gas recombination sites. The reaction kinetics and the transport properties in the acid electrolyte solution are making the process possible at practical rates. Typical recombination rates for oxygen are of the order of 15 mA/cm**2. For hydrogen, the observed starting rate of recombination exceeds self-discharge evolution in a lead-calcium system by a factor of at least 30. A review of various operational characteristics is given including half-cell potentials, cell voltages, internal pressures, and hydrogen partial pressures. 12 refs.

ID NO.- EI740209818 409818
LE VEHICULE ELECTRIQUE URBAIN. $left bracket$ Urban Electrical Vehicle $right bracket$ .
Wolf, R.
E. D. F. , Fr
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (URBAN PLANNING, Transportation), ELECTRIC MOTORS,
CARD ALERT- 403, 432, 702
CODEN- RVFEAX SOURCE- Rev Fr Energ v 24 n 255 Jul-Aug 1973 p 414-420

Research carried out to improve some components of urban electrical vehicles is described. In particular, progress in increasing the performance of lead-acid batteries (from 22 Wh/kg to 45 Wh/kg) and their service life (from 500 to 600 recharging cycles) is noted. Different solutions for motors and control organs and of vehicle structure are briefly reviewed. Experimental realization of prototypes is surveyed and problems of economic expediency are discussed. It is concluded that at the moment these vehicles would be too costly. Further development is necessary. In French.

ID NO.- EI740207693 407693

DIE ZEITSTANDFESTIGKEIT VON BLEI-GUSSWERKSTOFFEN FUER BATTERIEGITTER. $left bracket$ Creep Resistance of Lead Casting Alloys for Battery Grids $right bracket$ .

Drefahl, Klaus; Heubner, Ulrich

Metallgesellsch, Frankfurt A M, Ger

DESCRIPTORS- (*LEAD AND ALLOYS, *Creep), ELECTRIC BATTERIES,

CARD ALERT- 421, 534, 546, 702

CODEN- ZEMTAE SOURCE- Z Metallkd v 64 n 10 Oct 1973 p 669-672

The creep behavior of commercial lead battery grids was determined at 20C. For grids of lead antimony alloys containing arsenic and copper, the 1000-hr creep strength lies between 2. 0 and 2. 3 kg/mm**2, near the values of 2. 4 to 2. 5 kg/mm**2 typical for technically useful dispersion hardened lead alloys. The creep strength increases with increasing arsenic content while, in the concentration range studied (5 to 9 wt. % Sb, 0. 01 to 0. 05 wt. % Cu), variations of the antimony and copper contents have only minor effects. The creep strength of maximum 0. 8 kg/mm**2 of the Pb-0. 07 Ca alloy studied is small and lower than many of the values given in the literature for wrought lead calcium alloys. In German.

ID NO.- EI731259596 359596
ADVANCED BATTERIES SPUR PROGRESS IN ELECTRIC CARS.
Hartley, Peter; Edwards, Geoff
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Electric),
CARD ALERT- 662, 702, 705
CODEN- DEMCBS SOURCE- Des Eng (London) Sep 1973 p 66-67

Improvements in the specific performance of lead-acid cells and the way in which they relate to electric car control-system developments, are described.

ID NO.- EI731152761 352761
MODEL FOR DISCHARGE OF STORAGE BATTERIES.
Gidaspow, Dimitri; Baker, Bernard S.
Inst of Gas Technol, Chicago, Ill
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTRODES, ELECTROCHEMICAL,
IDENTIFIERS- PORE PLUGGING, POROUS ELECTRODE
CARD ALERT- 702
CODEN- JESOAN SOURCE- J Electrochem Soc v 120 n 8 Aug 1973 p 1005-1010

The common porous electrode model has been rederived to include the transformation of one solid phase into another, for example, lead into lead sulfate. Differential mass balances for the solid porous reactant and the solid product yielded new dimensionless groups which characterize the structural changes that occur during discharge of charge of storage batteries. Effects of fraction of active material, exchange current and molar density ratios on overpotential at a constant current were investigated numerically. The trends agree well with the empirical correlation of C. M. Shepherd. 18 refs.

ID NO.- EI730944590 344590

INVESTIGATIONS OF AN ALKALINE ELECTROLYTE FOR Zn-PbO//2 CELLS.

Rao, M. L. B.

P. R. Mallory and Co, Burlington, Mass

DESCRIPTORS- *ELECTRIC BATTERIES, PRIMARY, ELECTROLYTES, ZINC COMPOUNDS,

IDENTIFIERS- ZINC-LEAD OXIDE CELL, ALKALINE PRIMARY CELL

CARD ALERT- 702, 803, 804

CODEN- JESOAN SOURCE- J Electrochem Soc v 120 n 7 Jul 1973 p 855-857

Investigations of electrolytes for the operation of Zn-PbO//2 primary cells indicated that an ammoniacal zinc salt solution was satisfactory for the purpose. The stability of PbO//2, the ssolubility of PbO, and the corrosion rate of zinc in the electrolyte were acceptable. Cell evaluation was carried out in wound-electrode and bobbin-type C-size cells. The cell characteristics and performance are compared with zinc-carbon cells. The limitations of the new system are discussed. 15 refs.

ID NO.- EI730733929 333929

POWER SOURCES SYMPOSIUM, 25th, PROCEEDINGS, ATLANTIC CITY, NJ, MAY 23-25 1972, SPONSORED BY THE POWER SOURCES TECHNICAL AREA, ELECTRONICS TECHNOLOGY AND DEVICE LABORATORY, U S ARMY ELECTRONICS COMMAND, FORT MONMOUTH, NJ.

Hennigan, Thomas J.; Palandati, Charles F.; Charkey, A.; Wagner, O.; Levine, C.; Sulkes, M.; Salihi, J. T.; Hunter, B. V.; Horton, J. H.; Amlie, R. F.; Weissman, E. Y.; Qureshi, N. M.; McWhorter, T. A.; Bishop, W. S.

DESCRIPTORS- *ELECTRIC BATTERIES, ELECTRIC BATTERIES, SECONDARY, (SPACE VEHICLES, Power Supply), ELECTRIC POWER GENERATION, STORAGE BATTERY VEHICLES,

IDENTIFIERS- THERMAL ENERGY CONVERSION

CARD ALERT- 615, 655, 702

SOURCE- Power Sources Symp, 25th, 1972. PSC Publ Comm, P. O. Box 891, Red Bank, NJ, 1972, 198 p

Following is the continuation of the list of titles and authors of 56 papers presented: Sealed Silver Oxide Zinc Cells for Orbiting and Planetary Missions. By Thomas J. Hennigan and Charles F. Palandati. Sealed Nickel-Zinc Cells By A. Charkey. Metal-Air (Oxygen) Batteries. By O. Wagner. Sodium-Sulfur Batteries. By C. Levine. Primary-Secondary Battery Hybrid Systems. By M. Sulkes. Hybrid Power Sources for Electric Vehicles. By J. T. Salihi. Charging Ni-Cd and Pb-Acid Batteries from Common Generator. By B. V. Hunter. Thermal Power Sources $EM DASH$ A Background Review. By J. H. Horton. Gelled Acid Water-Activated Lead-Acid Batteries. By R. F. Amlie, E. Y. Weisman, and N. M. Qureshi. Sealed Aircraft Battery with Integral Power Conditioner. By T. A. McWhorter and W. S. Bishop.

ID NO.- EI730628971     328971
ION SELECTIVITY AND DIFFUSION POTENTIALS IN CORROSION LAYERS PbSO//4 FILMS ON Pb IN H//2SO//4.
Ruetschi, P.
Leclanche, Yverdon, Switz
DESCRIPTORS- (*FILMS, *Metallic), ELECTRIC BATTERIES, SECONDARY, (LEAD AND ALLOYS, Corrosion), CORROSION,
IDENTIFIERS- LEAD-ACID BATTERY
CARD ALERT- 539, 546, 702
CODEN- JESOAN   SOURCE- J Electrochem Soc v 120 n 3 Mar 1973 p 331-336

The behavior of PbSO//4 corrosion layers on Pb in H//2SO//4 solutions is shown to resemble that of perm-selective PbSO//4 precipitation membranes, prepared by interdiffusion of Pb ions and SO//4 ions into cellophane foil. Diffusion potentials in these precipitation membranes follow, over a wide pH-range, the given equation and can reach values of several hundred mV. The lower limit of that electrode potential range where PbO forms in the inteior of the corrosion film can be predicted theoretically in a proper manner by taking into account the diffusion potential in the film. 35 refs.

ID NO.- EI730523429 323429
CURRENT DISTRIBUTION IN THE POROUS LEAD DIOXIDE ELECTRODE.
Simonsson, Daniel
Royal Inst of Technol, Stockholm, Swed
DESCRIPTORS- (*ELECTRODES, *Lead Compounds), ELECTRIC BATTERIES, ELECTRIC BATTERIES, SECONDARY,
IDENTIFIERS- POROUS ELECTRODES, LEAD-ACID BATTERY
CARD ALERT- 702, 704, 804
CODEN- JESOAN SOURCE- J Electrochem Soc v 120 n 2 Feb 1973 p 151-157

A theoretical analysis of initial current distribution in the porous lead dioxide electrode is made by application of the macrohomogeneous model for porous electrodes. The parameters in the model have been determined experimentally for the investigated lead-dioxide battery plates. The theoretical results are in good agreement with experimental determinations by means of electron microprobe analysis of the PbSO//4-distribution within partly discharged positive lead-acid plates. The experimental studies of current distribution shows that at high current densities the electrode reaction takes place mainly in the outer layers of the eelectrode. At low discharge currents, the initial current distribution is uniform while after the first quarter of discharge, the outer layers are more utilized than the inner parts. A mechanism for the passivation of the positive plate in the lead-acid battery is proposed. 13 refs.

ID NO.- EI730523225 323225

DEVELOPING FOR MANUFACTURE OF THE BELL SYSTEM LEAD-ACID BATTERY.

Berberick, Frank A.; Durr, Helmut E.; Haller, Albert A.; Biron, Ernest J.

DESCRIPTORS- (*ELECTRIC BATTERIES, SECONDARY, *Manufacture),

CARD ALERT- 702

CODEN- WELEAX SOURCE- West Electr Eng v 17 n 1 Jan 1973 p 18-28

New production machinery was required to manufacture a lead-acid battery, the capacity of which increases with age through a life of more than thirty years. Installed in a design capability line, these facilities included machines for pasting the battery's circular, conical plate grids, for bonding the stacked positive plates together by passing heated metal tips through the junctions of pure lead surfaces to be joined, and for bonding stacked negative plates together by pouring molten lead alloy into a center core formed by their hollow hubs.

ID NO.- EI730523219 323219

DIE ENTLADEDATEN VON BLEIBATTERIEN UND IHR EINFLUSS AUF DIE OPTIMIERUNG DES SPEICHERANTEILS VON ELEKTROFAHRZEUGEN. $left bracket$ Discharge Data of Lead Batteries and Their Influence on the Optimization of the Storage Capacity of Electric Vehicles $right bracket$ .

Runge, Wolfgang

Technische Hochschule, Aachen, Ger

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, STORAGE BATTERY VEHICLES,

CARD ALERT- 702

CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 94 n 2 Feb 1973 p 83-86

Influence of the discharge current of a lead-acid battery on the utilizable capacity and on the discharge voltage are presented by analytical functions. From this the correlation between the available energy and the power output of the battery is derived to calculate the range of a storage battery vehicle. 3 refs. In German with English abstract.

ID NO.- EI730523217 323217

DYNAMIC CHARACTERIZATION OF LEAD-ACID BATTERIES FOR VEHICLE APPLICATIONS.

Taylor, D. F.; Siwek, E. G.

GE

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, STORAGE BATTERY VEHICLES, (AIR POLLUTION, Control),

CARD ALERT- 451, 702

CODEN- SEPPA8 SOURCE- SAE Prepr n 730252 for Meet Jan 8-12 1973 11 p

A method has been demonstrated for quantitatively predicting battery discharge capabilities with arbitrary load profiles in which capacity recuperation is an important factor. Only the constant-current discharge characteristics of the battery are required. The accuracy of load profile analysis is limited by two factors: The mathematical representation of discharge time to a specified voltage cutoff versus the constant discharge current; and an anomalous reduction in discharge capacity which is particularly evident with short open circuit periods and could be an important factor for batteries in electric vehicles if it is not solely the effect of local heating.

ID NO.- EI730421078 321078
ELECTRIC VEHICLE HYBRID POWER TRAIN.
Kugler, George C.
ESB Inc
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (ELECTRIC TRACTION, Flywheel Propulsion),
CARD ALERT- 702, 705
CODEN- SEPPA8 SOURCE- SAE Prepr n 730254 for Meet Jan 8-12 1973 5 p

With the goal of reducing the high current peaks which occur in lead-acid batteries used for electric vehicles, a new power train incorporating an inertial storage device coupled to a continuously running electric motor has been designed. The power train consists in part of an electric motor designed for efficient operations over a narrow speed range. Once activated, the motor runs continuously even though the automobile is stopped; during the rest periods the motor stores energy in a kinetic device which acts as an energy load leveler. Such an electric motor-inertia hybrid power train has several advantages: high-power output capability, all mechanical regenerative braking, extended battery life, increased electric motor efficiency, and elimination of expensive solid-state motor controllers.

ID NO.- EI730417648 317648
MODELING AND TESTING OF STORAGE BATTERIES.
Kleckner, K. R.
Oakland Univ, Rochester, Mich
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, STORAGE BATTERY VEHICLES,
CARD ALERT- 702
CODEN- SEPPA8 SOURCE- SAE Prepr n 730251 for Meet Jan 8-12 1973 10 p

This paper develops and evaluates an elementary electrical circuit model for a storage cell. The model is applied to both lead-acid and nickel-cadmium cells. It exhibits the appropriate terminal voltage, current behavior and, for lead-acid batteries, the oobserved nonreciprical power-energy relationship. The circuit model provides an accurate simulation of electric vehicle propulsion batteries, enabling vehicle designers to make good preliminary evaluations of driving range under a variety of conditions, including urban driving cycles.

ID NO.- EI730417646 317646

BATTERY TECHNOLOGY: ADVANCED BATTERY CONCEPTS.

Charkey, A.; Eisenberg, M.; Girot, G.; Silverman, H. P.; Garner, N. R.; Sayano, R. R.; Biddick, R. E.; Seo, E. T.; Snider, W. E.; Nagle, W. J.

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

SOURCE- Intersoc Energy Convers Eng Conf, 7th, Conf Proc, San Diego, Calif, Sep 25-29 1972, p 110-125

Following is the list of titles and authors of papers given during the session on Battery Technology: Advanced Battery Concepts. Nickel-Zinc Cells for Sustained High Rate Discharge Applications. By A. Charkey. Mercuric Oxide-Cadmium (Mercad) Batteries for Low Temperature Operations. By M. Eisenberg and G. Girot. Optimization of Lead-Acid Batteries for High Power-Short Pulse Operation. By H. P. Silverman, N. R. Garner, R. R. Sayano, R. E. Biddick and E. T. SEo. Nonleaking Battery Terminals. By W. E. Snider and W. J. Nagle.

ID NO.- EI730315691 315691
UNH ELECTRIC-HYBRID VEHICLE.
Wood, A. P.; Parkard, A. T.
Univ of New Hampshire, Durham
DESCRIPTORS- *STORAGE BATTERY VEHICLES,
CARD ALERT- 662, 702
SOURCE- IEEE, Northeast Electronics Research & Eng Meeting, NEREM Record, Tech Application Papers, v 12, 1970, New York, p 44-45

The design and development of a low pollution vehicle are reported. A tubular steel frame was designed to accommodate a 120 v lead-acid battery buffer and tandem motor, four wheel drive system. The chassis is also fitted with a propane fired, ICE recharge system. The original body design is constructed of fiberglass.

ID NO.- EI730312386 312386

ELECTROMOTIVE FORCE MEASUREMENTS ON HIGH-TEMPERATURE SULFIDE FORMATION CELLS.

Thompson, W. T.; Flengas, S. N.

Univ of Toronto, Ont

DESCRIPTORS- *ELECTROCHEMISTRY, THERMODYNAMICS, ELECTRODES,

IDENTIFIERS- MOLTEN SOLUTIONS, FORMATION CELL

CARD ALERT- 641, 704, 801

CODEN- JESOAN SOURCE- J Electrochem Soc v 119 n 4 Apr 1972 p 399-404

Using formation cells with a sulfur vapor electrode, relative partial molar thermochemical properties are reported for the sulfide-rich region of the molten lead sulfide-lead chloride and silver sulfide-chloride systems. Negative deviations from Raoultian ideality observed in the former system and positive deviations in the latter are tentatively related to available molar conductance data. 18 refs.

ID NO.- EI730312187 312187

RECENT RESULTS ON LEAD-CALCIUM ALLOYS AS GRID MATERIALS FOR LEAD-ACID BATTERIES.

Mao, G. W.; Larson, J. G.; Rao, P.
Gould Inc, Mendota Heights, Minn
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, (CORROSION, Electrochemical), LEAD AND ALLOYS,
IDENTIFIERS- PRESSURE CAST GRIDS, OCRROSION MORPHOLOGY
CARD ALERT- 539, 546, 702, 802
CODEN- JESOAN SOURCE- J Electrochem Soc v 120 n 1 Jan 1973 p 11-17

The investigation shows that controlled solidification of pressure cast grids can produce physically sound grids which are corrosion and growth resistant. Differences between industrial and automotive SLI grids cast by gravity and pressure casting techniques are revealed. The effect of casting temperature on the microstructure and anodic corrosion characteristics of lead-calcium alloys ranging from 0. 01 to 0. 1% calcium content is also presented. 6 refs.

ID NO.- EI730312186 312186

BATTERY COUNCIL INTERNATIONAL, 83RD ANNUAL CONVENTION.

Symp

DESCRIPTORS- *ELECTRIC BATTERIES, ELECTRIC POWER GENERATION, AUTOMOBILES, FUEL CELLS, LEAD AND ALLOYS, AIR POLLUTION,

CARD ALERT- 451, 546, 615, 662, 702

SOURCE- Battery Council International, 83rd Annual Convention, Phoenix, Ariz, Apr 26-28 1971, 133 p

New developments in battery design, production and prformance are presented. Included are a water-activated lead and battery, a maintenance-free unit that requires no water additions, results showing causes of failure, new materials, plus reports on marketing methods.

ID NO.- EI7302070 85 307085

VOLTAMMETRIC INVESTIGATIONS OF NEGATIVE LEAD BATTERY ELECTRODES: THE EFFECT OF ORGANIC EXPANDERS.

Niklas, H.; Jakobljevich, H.

Forschungs- und Entwicklungszentrum, Kelkheim/Ts, Ger

DESCRIPTORS- (*ELECTRODES, *Lead), ELECTROCHEMISTRY, (ELECTRIC BATTERIES, Electrodes),

IDENTIFIERS- ORGANIC EXPANDERS

CARD ALERT- 702, 704, 801

CODEN- JAELBJ SOURCE- J Appl Electrochem v 2 n 3 Aug 1972 p 165-167, plate

By means of a continuous voltammetric sweep technique, the formation process of lead sheets in sulphuric acid can be investigated. Its behaviour depends strictly on the presence of certain organic substances. As an example, the effect of some expanders and other additives is demonstrated. 4 refs.

ID NO.- EI730206809 306809
INDUSTRIAL BATTERY CHARGER FOR MOBILE EQUIPMENT USE.
Brugger, C.
Motorola Semiconductors Ltd
DESCRIPTORS- (*ELECTRIC BATTERIES, *Charging),
CODEN- CTLIAW SOURCE- Control Instrum v 4 n 9 Oct 1972 p 45-47

The design of a 20 amp battery charger for use with heavy-duty lead-acidd batteries is discussed. To save space and ease design, a dual integrated circuit operational amplifier is employed in the charger.

ID NO.- EI730206808 306808
HIGH-RATE LEAD-ACID BATTERIES FOR HYBRID VEHICLES.
Biddick, R. E.; Mueller, G. A.; Sayano, R. R.; Silverman, H. P.
Gould Inc, St. Paul, Minn
DESCRIPTORS- *ELECTRIC BATTERIES,
IDENTIFIERS- HYBRID VEHICLES
CARD ALERT- 702
SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 295-306

High-rate discharge and charge capabilities of a modern SLI battery in simulated heat engine/electric hybrid vehicle duty were determined experimentally. Electrical energy losses due to resistance, activation, and concentration polarizations, and to gas evolution were measured. Also, contributions of electrolyte, grids, connectors, and active material to resistance were estimated. Possibilities for a battery of this type to meet power, charge acceptance, and weight requirements specified by the Environmental Protection Agency are assessed.

ID NO.- EI7302C6805 306805

PERFORMANCE CAPABILITIES OF ELECTRIC HIGHWAY VEHICLES UTILIZING LEAD ACID BATTERIES.

Goldman, Wayne E.

Anderson Power Products Inc, Brighton, Mass

DESCRIPTORS- *ELECTRIC BATTERIES, (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications), STORAGE BATTERY VEHICLES,

IDENTIFIERS- LEAD-ACID BATTERY

CARD ALERT- 701, 702, 932

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 242-254

Factors governing the selection of a battery for use in electric highway vehicles and the question of whether the range of an electric vehicle is actually the range of a battery charge are both examined in detail.

ID NO.- EI730206804 306804
BATTERIES FOR THE HYBRID HEAT ENGINE/ELECTRIC VEHICLE.
Kettler, Jack R.
Aerospace Corp, El Segundo, Calif
DESCRIPTORS- *ELECTRIC BATTERIES, (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications),
IDENTIFIERS- HYBRID VEHICLES
CARD ALERT- 701, 702, 932
SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio Mar 7-8 1972, Electrochem Soc, p 213-241

Hybrid heat engine/electric vehicles were studied to determine their potential to reduce vehicle emissions and to provide an acceptable alternate for today's vehicles. A critical component of the hybrid vehicle is the battery which is used to support transient power demands. The requirements which such a battery must meet and the ability of various batteries to meet these requirements are discussed. The battery must have a high cycle life, power and energy density and must be economical to purchase and operate. The state-of-the-art of secondary batteries was examined and it was found that the nickel-cadmium, lead-acid, and nickel-zinc batteries could potentially satisfy most of the criteria, including the availability of a prototype battery system within five years. 19 refs.

ID NO.- EI7302C6800 306800

MECHANISM OF THE PROCESSES OF FORMATION OF LEAD-ACID BATTERY POSITIVE AND NEGATIVE PLATES.

Pavlov, D.

Bulgarian Academy of Sciences, Sofia

DESCRIPTORS- *ELECTRIC BATTERIES, ELECTROCHEMISTRY, (PROPULSION, Electric Energy),

IDENTIFIERS- LEAD-ACID BATTERY

CARD ALERT- 701, 702, 801

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 135-149

Formation is an important stage of the technological process of lead-acid battery production. Its main purposes are: first, to transform lead oxide and the basic sulfates of the paste into active material, i. e. , to lead at the negative plate and to lead dioxide at the positive plate, and, second, to create a microporous structure of this active mass, ensuring high battery performance. The present work deals with the mechanism of the chemical and electrochemical processes occurring during the various stages of formation in the two types of plates. 14 Ah starter battery plates were pasted with commercial pastes with a density of 3. 8 g/cm**3 for the positive and 4. 2 g/cm**3 for the negative plate. Formation was performed in sulfuric acid sp. gr. 1. 05 at a current density of 5 mA/cm**2. The chemical and electrochemical processes were elucidated by following the phase and chemical composition of the paste at two-hour intervals. The experimental cells consisted of two plates under investigation arranged between three plates of opposite sign. 23 refs.

ID NO.- EI730206799 306799

CONSTRUCTION AND PERFORMANCE OF A QUASI-BIPOLAR LEAD-ACID BATTERY PLATE FOR ELECTRIC PROPULSION.

Taylor, A. H.; Giner, J.; Goebel, F.

Tyco Lab, Inc, Waltham, Mass

DESCRIPTORS- *ELECTRIC BATTERIES, (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications),

IDENTIFIERS- QUASI-BIPOLAR PLATE

CARD ALERT- 701, 702, 932

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 102-134

A program has been undertaken to develop a lead acid battery system for use in a hybrid heat engine/electric vehicle. In the most severe operating mode, this battery must show a power density of at least 100 W/lb during the discharge pulses. Correspondingly, the minimum power density is 55 W/lb during the recharge pulses. The energy transferred during these pulses is, however, relatively small (1. 38 Whr/lb. ) To meet these requirements with due consideration of additional specifications regarding battery life, voltage and time, a $left double quote$ quasi-bipolar $right double quote$ plate was developed. Pure Pb strips placed on each side provide conduction between sides of the substrate. Results show that the energy density of the full scale module based on the $left double quote$ quasi-bipolar $right double quote$ plates would be 9. 7 Whr/lb at 100 W/lb and 20 Whr/lb at the C/5 discharge rate while the commercial thin plate SLI battery has an energy density of 5. 9 Whr/lb at 100 W/lb and 17. 5 Whr/lb at the C/5 discharge rate. 23 refs.

ID NO.- EI730206798 306798

DATA AND PERFORMANCE REQUIRED OF THE LEAD ACID BATTERY BY THE ELECTRIC VEHICLE DESIGNER.

Cook, Albert R.

Int Lead Zinc Res Organization, Inc, New York, NY

DESCRIPTORS- *ELECTRIC BATTERIES, INDUSTRIAL TRUCKS, (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications),

CARD ALERT- 663, 691, 701, 702

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 65-101

The battery requirements for in-plant materials handling trucks are analyzed. These requirements include: lower first cost, reduced maintenance cost and longer life, reduced life, a convenient method for determining battery drain, adequately designed batteries, equipment for easily changing batteries. 17 refs.

ID NO.- EI730206796 306796

BATTERIES FOR GROUND TRANSPORTATION SYSTEMS.

Salomon, Mark

U S Department of Transportation, Cambridge, Mass

DESCRIPTORS- *ELECTRIC BATTERIES, FUEL CELLS, STORAGE BATTERY VEHICLES,

CARD ALERT- 702

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 26-41

An examination is made of lead-acid batteries, Ni/Zn batteries, fuel cells, organic electrolyte batteries and high temperature batteries to determine their potential usefulness as portable power sources for use in electric vehicles. 18 refs.

ID NO.- EI730206795     306795

CANDIDATE BATTERIES FOR ELECTRIC VEHICLES.

Gross, Sidney

Boeing Co, Seattle, Wash

DESCRIPTORS- *ELECTRIC BATTERIES, FUEL CELLS, STORAGE BATTERY VEHICLES, (ELECTRIC BATTERIES, Secondary), (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications),

IDENTIFIERS- LEAD-ACID BATTERY, HIGH TEMPERATURE BATTERIES, SOLID-STATE BATTERIES, ORGANIC ELECTROLYTE BATTERIES

CARD ALERT- 701, 702, 932

SOURCE- Proc of Symp on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972, Electrochem Soc, p 9-25

The purpose of this paper is to gather in one place brief summaries of most of the battery systems that can be considered for electric vehicles. Many little known systems are included, some with little or no experimental background; these are worthy of serious consideration and are suggested as possible avenues for future research. Conversely, well-known systems are discussed sparingly, for commentary on these is abundant. 100 refs.

ID NO.- EI730206794 306794

PROCEEDINGS OF THE SYMPOSIUM ON BATTERIES FOR TRACTION AND PROPULSION.

Kerry, Robert L.; McCallum, John; Semones, Donald E.

U S Air Force, Aero Propulsion Lab, Dayton, Ohio

DESCRIPTORS- *ELECTRIC BATTERIES, FUEL CELLS, ELECTRIC BATTERIES, SECONDARY, STORAGE BATTERY VEHICLES, (PROPULSION, Electric Energy), (PROPULSION, Land Vehicle Applications),

CARD ALERT- 701, 702, 932

SOURCE- Proceedings of the Symposium on Batteries for Traction and Propulsion, Columbus, Ohio, Mar 7-8 1972 Electrochem Soc, Columbus Sect, Ohio, 1972, 333 p

The 17 papers contained in this symposium cover such subjects as batteries and fuel cells for propulsion; batteries for electric vehicles; the data and performance of the lead-acid battery to be used in electric vehicles; zinc-air batteries for traction and propulsion; electric transit bus requirements; and high-rate lead acid batteries for hybrid vehicles. Individual papers are indexed separately.

ID NO.- EI721321407     299403
EVALUATION OF LEAD PLANT WASTEWATER TREATMENT METHODS.
Haas, Willard R.; Miller, Sol
IIT Res Inst, Chicago, Ill
DESCRIPTORS- *ELECTRIC BATTERIES, IONS, LEAD AND ALLOYS, ENVIRONMENTAL ENGINEERING,
CARD ALERT- 546, 702, 901
SOURCE- Evaluation of Lead Plant Wastewater Treatment Methods, 2 Parts, Illinois Inst Technol Res Inst, Rep IITRI-C8213-2, Final Report, Feb 15 1972, Part 1, 39 p, Part 2, 20 p

The best treatment process viewed used NaOH to neutralize the acid in their effluent. This system resulted in an effluent lead concentration of 0. 04 ppm with 0. 02 ppm suspended. A range of tolerances of aerobic activated sludge microorganisms to five different soluble metal ions (lead, zinc, antimony, arsenic and cadmium) is also given.

ID NO.- EI721320840 298837

NEW WATER-ACTIVATED LEAD-ACID BATTERY CONCEPT.

Amlie, R. F.; Weissman, E. Y.; Morehouse, C. K.; Qureshi, N. M.

Globe-Union, Inc, Milwaukee, Wis

DESCRIPTORS- *ELECTRIC BATTERIES, GELS, ELECTROLYTES, ELECTROCHEMISTRY,

IDENTIFIERS- GELLED SULPHURIC ACID, BORON PHOSPHATE GELS, LEAD-ACID BATTERY, DRY-CHARGED BATTERY

CARD ALERT- 702, 801, 803, 804

CODEN- JESOAN SOURCE- J Electrochem Soc v 119 n 5 May 1972 p 568-571

A discussion is presented of a reserve lead-acid battery concept based on water-soluble sulfuric acid gels. The gels consist primarily of 100% sulfuric acid plus small amounts of boric and phosphoric acids. These gels exhibit excellent mechanical and thermal stability characteristics when prepared with a relatively large molar excess of boric acid with respect to phosphoric acid. The rate of water activation of a battery containing this gel is controllable, and no solid residues are left after the activation has been completed. Performance, life and electrolyte composition aspects are covered in this discussion, with a view to defining the advantages and limitations of the system and its future possibilities. 30 refs.

ID NO.- EI721319743 297740

VERGLEICH DES ERRECHNETEN VERHALTENS VON BLEIAKKUMULATOREN MIT DEM GEMESSENEN UND URSACHEN FUER DIE ABWEICHUNGEN. $left bracket$ Comparison Between Calculated and Measured Behaviour of a Lead-Acid Battery and Reasons for the Deviations $right bracket$ . .

Runge, Wolfgang

Technische Hochschule, Aachen, Ger

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 93 n 2 Feb 1972 p 67-72

The deviations between calculated and measured behavior of a lead-acid battery can be explained by the inactivation of pores due to sulfate deposition and by inhibited reaction due to formation and reformation of lead sulfates. 6 refs.

ID NO.- EI721319742 297739
BEITRAG ZUR MATHEMATISCHEN BESCHREIBUNG DER ELEKTROCHEMISCHEN VORGAENGE IM BLEIAKKUMULATOR. $left bracket$ Contribution to the Mathematical Description of the Electrochemical Processes in Lead Storage Batteries $right bracket$ .

Lehning, Heiko

Technische Hochschule, Aachen, Ger

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- EKZAA3 SOURCE- Elektrotech Z Ausg A v 93 n 2 Feb 1972 p 62-66

Exact analysis of reactions and transient processes in a lead storage battery leads to differential equations whose solution facilitates the analytical descriptions of the discharge of a battery. It is shown that the quantitative assessment of disturbing influences like pore inactivity, cross section reduction and changes in volume as well as acid conveyence through convection is not possible. Steady as well as interrupted discharges are discussed, assesssing the drainable capacity dependence of a battery on the discharge current. 5 refs.

ID NO.- EI721319147 297145

STUDY OF LEAD-RICH Pb-Cd-Sb ALLOYS.

Rao, P.; Mao, G. W.

Gould Inc, St. Paul, Minn

DESCRIPTORS- (*LEAD CADMIUM ANTIMONY ALLOYS, *Mechanical Properties)
, ELECTRIC BATTERIES,

CARD ALERT- 546, 702

CODEN- JIMEAP SOURCE- J Inst Met (London) v 100 Jan 1972 p 13-19

During an investigation of the lead/acid battery characteristics of some lead-rich alloys in the Pb-Sb system, the initial results revealed a maximum in tensile properties for an as-cast alloy at a composition of Pb-3. 0% Cd-2. 5% Sb. The ultimate tensile strength and 0. 2% offset yield strength for this alloy are 72. 5 MN/m**2 and 43. 5 MN/m**2, respectively. 14 refs.

ID NO.- EI721318444 296442
ENTWICKLUNGSSTAND DES ELEKTROFAHRZEUGS. $left bracket$ Development of Electric Automobiles $right bracket$ .

Strifler, Paul

DESCRIPTORS- (*AUTOMOBILES, *Electric), STORAGE BATTERY VEHICLES,

CARD ALERT- 605, 662, 702

CODEN- AUTZA6 SOURCE- Automobiltech Z v 74 n 6 Jun 1972 p 244-248

The status of the development of electrically driven automobiles is presented by summarizing the content of 38 reports submitted on a seminar held in Brussels. Problems facing current car designers are outlined. In spite of disadvantages of lead storage batteries, there are good prospects for electric cars for use within cities. 11 refs. In German with English abstract.

ID NO.- EI721317442 295441

EINFLUSS DES KUPFERS AUF DIE ANODISCHE KORROSIONSGESCHWINDIGKEIT IN SCHWEFELSAEURE, AUF DIE MECHANISCHEN EIGENSCHAFTEN UND DIE DUENNFLUESSIGKEIT VON BLEI-ANTIMON-LEGIERUNGEN. $left bracket$ Effect of Copper on Anodic Corrosion Rate in H//2SO//4, Mechanical Properties, and Fluidity of Lead and Lead Antimony Alloys $right bracket$ .

Kirow, Antscho; Rogatschev, Temelaki; Denew, Dontscho
Forschungsinstitut fuer Nichteisenmetalle NIPKIZM, Sofia, Bulg
DESCRIPTORS- *LEAD ANTIMONY ALLOYS, ELECTRIC BATTERIES,
CARD ALERT- 421, 539, 546, 702
CODEN- MOFEAV SOURCE- Metalloberflaeche v 26 n 6 Jun 1972 p 234-237

Experimental data are plotted for Pb alloys with 0 to 11. 57% Sb and 0 to 2% Cu. Mechanical strength and fluidity increase slightly with increase of Cu to 0. 06%, then decrease with larger copper additions. The combined effects of Sb and Cu on H//2SO//4 corrosion resistance of lead are complex. Starter batteries of a Pb-6. 12. Sb-0. 069Cu alloy were found to be superior in service to those with Pb-Sb alloys. In German.

ID NO.- EI721214370 292369

BLEISULFATVERTEILUNG IN ENTLADENEN NEGATIVEN ELEKTRODEN-PLATTEN VON BLEIAKKUMULATOREN. $left bracket$ Lead Sulfate Distribution in Discharged Negative Electrode Plates of Lead Batteries $right bracket$ .

Panesar, H. S.; Portscher, V.

VARTA Forschungs- und Entwicklungszentrum, Kelkheim, Ger

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- MOFEAV SOURCE- Metalloberflaeche v 26 n 7 Jul 1972 p 252-253

Three PbSO//4 profiles are plotted and discussed; one shows PbSO//4 distribution in totally discharged negative electrode plates as a function of discharge density (1. 5 to 180 ma/sq cm). Two show PbSO//4 distribution as a function of the state of discharge (25 to 100%) for discharge densities of 30 and 180 ma/sq cm, respectively. In German.

ID NO.- EI721213844 291843

LEAD-ACID BATTERY: A NEW SHAPE FOR AN OLD WORKHORSE.

Feder, D. O.; Biagetti, R. V.

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

CODEN- BLRCAB SOURCE- Bell Lab Rec v 50 n 7 Aug 1972 p 206-211

A novel design and an unusual manufacturing process contribute to a lead-acid battery with superior corrosion-resistance and a dramatic improvement in reliability. The cylindrical battery can operate continuously for thirty years in temperatures up to 100 $degree$ F.

ID NO.- EI721213810 291809
EFFECT OF GRID CAST STRUCTURE ON THE ANODIC CORROSION OF LEAD.
Feliu, S.; Galan, L.; Gonzalez, J. A.
Centro Nacional de Investigaciones Metalurgicas, Ciudad
DESCRIPTORS- (*LEAD AND ALLOYS, *Corrosion), CORPOSION, ELECTRIC BATTERIES,
CARD ALERT- 539, 546, 702
CODEN- WSKRAT SOURCE- Werkst Korros v 23 n 7 Jul 1972 p 554-561

Unalloyed lead, Pb-0. 09Ca, Pb-0. 46Ag, Pb-6Sb, Pb-11. 6Sb, and Pb-6Sb-0. 2Ag-0. 2As-0. 5Sn were subjected to anodic corrosion in H//2SO//4 at current densities of 0. 84 and 0. 14 ma/sq cm. Specimens varied in grain size. Weight losses were determined and correlated with results of microscopic examinations. Grain size did affect corrosion, but the effect depended on composition. An explanation is suggested in terms of selective attack of the material and disintegration of structural units.

ID NO.- EI721212791 290790
LEAD-FLUOROBORIC ACID BATTERY.
McDonald, G. D.; Weissman, E. Y.; Roemer, T. S.
Globe-Union, Inc, Milwaukee, Wis
DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY, ELECTROLYTES, ELECTRODES,
IDENTIFIERS- RESERVE BATTERY, LEAD-FLUOROBORIC ACID BATTERY, BONDED LEAD DIOXIDE ELECTRODE, PROXIMITY FUZE BATTERY
CARD ALERT- 702, 803, 804
CODEN- JESOAN SOURCE- J Electrochem Soc v 119 n 6 Jun 1972 p 660-663

A reserve battery is described that can operate over a wide temperature range, including temperatures as low as $minus$ 60 $degree$ C at coulombic efficiencies of 16% or better. The battery is based on the system: lead/fluoroboric acid/lead dioxide and utilizes a bonded lead dioxide cathode. The system is discussed based on data such as: capacities, current-voltage relationships, and coulombic efficiencies, as a function of temperature; self-discharge characteristics; specific energy; and cost considerations. 7 refs.

ID NO.- EI721109944     287943

LEAD-ACID BATTERY: A NEW SHAPE FOR AN OLD WORKHORSE.

Feder, D. O.; Biagetti, R. V.

DESCRIPTORS- *ELECTRIC BATTERIES, SECONDARY,

CARD ALERT- 702

CODEN- BLRCAB   SOURCE- Bell Lab Rec v 50 n 7 Aug 1972 p 206-211

A novel design and an unusual manufacturing process contribute to a lead-acid battery with superior corrosion-resistance and a dramatic improvement in reliability. The cylindrical battery can operate continuously for thirty years in temperatures up to 100 $degree$ F.

ID NO.- EI721108221 286220

REMOVAL OF SURFACE ANTIMONY FROM ANTIMONY LEAD ALLOYS BY SULFURIC ACID-HYDROGEN PEROXIDE PICKLING.

Crompton, T. R.; Uitenbroek, G.

Oldham & Son Ltd, Denton, Manchester, Engl

DESCRIPTORS- (*ELECTRIC BATTERIES, *Manufacture), PICKLING, ANTIMONY AND ALLOYS, CORROSION,

IDENTIFIERS- BATTERY GRIDS, LEAD-ACID BATTERY

CARD ALERT- 539, 546, 702

CODEN- JESOAN SOURCE- J Electrochem Soc v 119 n 6 Jun 1972 p 655-660

It has been shown that treatment of cast antimonial lead alloys with mixtures of hydrogen peroxide and sulfuric acid at 20 $degree$ C dissolves surface antimony at an appreciably greater rate than occurs with sulfuric acid alone, even at elevated temperatures. Optimum hydrogen peroxide-sulfuric acid reagent compositions have been established for the maximum solution of antimony from the alloy. A correlation exists between the quantity of antimony removed by this treatment and the quantity of antimony that is subsequently released from the alloy into sulfuric acid electrolyte when it is set up as an anode against pure lead cathodes. Batteries made using positive grids which have been pickled in hydrogen peroxide-sulfuric acid mixtures, then brightened by dipping in a 10% aqueous solution of dilethylene triamine have been shown to have a greater life on charge/discharge cycles than batteries made using standard unpickled grids. 2 refs.

ID NO.- EI721104752 282752
NO-BREAK POWER SUPPLY FOR RADIO LINK STATIONS IN VENEZUELA.
Ungeheuer, Edgar
DESCRIPTORS- (*RADIO EQUIPMENT, *Power Supply),
CARD ALERT- 714, 716
SOURCE- AEG-Telefunken Prog n 4 1971 p 122-125

The construction and method of operation of no-break power supply equipments for radio link stations in Venezuela are described. The power supply equipments work either from the public network with a standby generating set or with two diesel sets in continuous duty. Two self-regulating chargers feed two lead-acid batteries, to whcih the radio link equipments are connected. The main components of the installations are described in detail. 2 refs.

ID NO.- EI721001509     279509
REAKCIE NIEKTORYCH KYSLIKATYCH ZLUCENIN OLVA SO SIRNIKOM ANTIMONITYM. $left bracket$Reactions of Some Oxygenated Compounds of Lead with Antimony Trisulfide. $right bracket$
Cengel, Juraj
Zavod Slovenskeho Narodneho Povstania, Banska Stiavnica, Czech
DESCRIPTORS- (*LEAD AND ALLOYS, *Scrap), ELECTRIC BATTERIES, (SCRAP METAL, Reprocessing),
CARD ALERT- 546, 702, 913
CODEN- HUTLA7   SOURCE- Hutn Listy v 27 n 4 Apr 1972 p 279-282

On the basis of thermodynamic investigations it is shown that the reactions of lead sulfate, lead dioxide, and lead monoxide with antimony trisulfide have a negative isobaric potential at certain temperatures. The end products of this reaction are hard lead and sulfur dioxide gas. The reaction can be utilized in the reclamation of lead battery scrap. In Czech.

ID NO.- EI721000981 278981

INTENSIFIKATSIYA PROTSESSA FORMIROVANIYA PLASTIN DLYA SVINTSOVYKH AKKUMULYATOROV. $left bracket$Intensifying the Process of Lamellae Formation for Lead Batteries. $right bracket$

Penchev, P. R.; Kolev, S. N.; Gishin, S. S.; Ivanov, S. V.; Stanev, V. I.

DESCRIPTORS- (*ELECTRODES, ELECTROCHEMICAL, *Forming),

CARD ALERT- 539, 702

CODEN- ELKTAQ SOURCE- Elektrotekhnika n 11 Nov 1971 p 58-59

Results of investigating the intensification of the electrolytic lamellae (electrodes) formation process for lead batteries are presented. It is shown that by switching the current periodically to the opposite polarity it is possible to increase the current density of formation and significantly shorten the process time. In Russian.

ID NO.- EI72X049738 249738
Development trends in the applications and processing of lead, (Entwicklungstendenzen in der Anwendung und Weiterverarbeitung von Blei)
REINERT M
Metallgesellschaft AG, Stolberg, West Germany
DESCRIPTORS- *LEAD AND ALLOYS, (LEAD AND ALLOYS, Corrosion Resisting ), LEAD PLATING, (LEAD AND ALLOYS, Mechanical Properties), ELECTRIC BATTERIES,
CARD ALERT- 421, 539, 546, 702
CODEN- ERZMA SOURCE- Erzmetall v 24 n 8 Aug 1971 p 361-8
Paper reviews state- of- art in research and discusses novel trends prevailing in title technology, particularly within the fields of - corrosion resistant and fine grain lead alloys; lead welding; homogeneous lead coatings; mechanical properties of lead; precipitation hardened lead; applications of lead in building industry and as sound insulating material; and lead containing electric batteries. 17 refs. In German.

ID NO.- EI72X042870 242870

Effect of the surface- active additions on the polarization distribution in the depth of the porous electrodes

AGUF IA

DESCRIPTORS- *ELECTRIC BATTERIES, ELECTRODES,

CARD ALERT- 702

CODEN- ELKTA SOURCE- Elektrotekhnika n 2 Feb 1971 p 55-6

The analysis presented is applied to the case where the speed of adsorption of the surface- active materials, affecting the potential distribution, is limited by the ionization of the responding particles. Respective equations are derived to show that the uniformity of the operation of the negative electrode of the lead storage battery can be improved by use of the anion- active additions. In Russian.

ID NO.- EI72X042867 242867

Graphite substrate lead dioxide with mild steel cathode in the preparation of chlorates

UDUPA HVK; SAMPATH S; NARASIMHAM KC; NAGALINGAM M; THIAGARAJAN N; CHANDRAN TJV; SUBRAMANIAN G; KANDASAMI S; NATARAJAN S; SUBBIAH P; PALANISAMY R

Central Electrochemical Res Inst, Karaikudi, India

DESCRIPTORS- (*ELECTRODES, *Graphite), CHLORINE COMPOUNDS, LEAD COMPOUNDS,

IDENTIFIERS- CHLORATES, LEAD OXIDES

CARD ALERT- 702, 803

CODEN- CHAIA SOURCE- Chem Age India v 22 n 1 Jan 1971 p 21-2

The present paper deals with the performance characteristics of a 200 amp cell used for the preparation of sodium chlorate with lead dioxide coated graphite anodes and mild steel cathode. The cell was run continuously with a view to evaluate the life of the anode. The lead dioxide coated graphite could be used continuously for 24 mo with a stainless steel cathode, but only for 12 mo with a mild steel cathode.

ID NO.- EI72X038359 238359
Lead- acid cell
BURBANK J; SIMON AC; WILLIHNGANZ E
Naval Res Lab, Washington, DC
DESCRIPTORS- *ELECTRIC BATTERIES,
CARD ALERT- 702
SOURCE- Adv Electrochem and Electrochem Eng, v 8. Wiley-Intersci, 1971, p 157-251

Recent research results, their relevance to both fundamental electrochemistry and the problems associated with further practical exploitation and discussed. This discussion will serve to stimulate further interest and investigation, in order that the maximum potentialities may ultimately be realized for this electrode system. 202 refs.

ID NO.- EI72X036299 236299
Advances in electrochemistry and electrochemical engineering, v 8, electrochemical engineering
TOBIAS ED CW
DESCRIPTORS- *ELECTROCHEMISTRY,
CARD ALERT- 801
SOURCE- Wiley-Interscience, Div of John Wiley & Sons, Inc, New York, 1971, 406 p

Five papers cover solid electrolyte batteries, thermal phenomena in fuel cells and batteries, the lead acid cell, electrochemistry and application of propylene carbonate, and anodic oxidation of hydrocarbons and hydrocarbon fuel cell. Individual papers are indexed separately.

ID NO.- EI72X035917 235917
Water- activated lead- acid dry- charged battery
BADGER JP
DESCRIPTORS- (*ELECTRIC BATTERIES, *Materials),
CARD ALERT- 702
SOURCE- SAE Pap 720040 for meeting Jan 10-14 1972, 15 p

A water- activable, dry- charged lead- acid automotive battery is described in which concentrated sulfuric acid is immobilized and stored in a phenolic foam block within each cell. The fact that sulfuric acid is an excellent desiccant and that the battery is sealed against entry of outside moisture prevents the oxidation of negative plates during storage. Thus, there is no need for post- activation charging. Safety is also provided by the phenolic block absorption of sulfuric acid.

ID NO.- EI72X035819 235819
Rapid charging batteries for electric propulsion systems
SPARKS RH
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (ELECTRIC BATTERIES, Charging), (AUTOMOBILES, Electric),
CARD ALERT- 662, 702
SOURCE- SAE Pap 720109 for meeting Jan 10-14 1972, 12 p

Nickel- cadmium batteries with capacities of 24 amp hr at 28 v have been successfully rapid charged in 5 to 10 min. Similarly 190 amp hr lead acid batteries have been rapid charged at 20 to 30 min. In both cases, application of depolarization discharge pulses was successful in preventing capacity fade and in minimizing battery heating and gassing near full charge at high charge rates.

ID NO.- EI72X035428 235428

Evaluation of the effective grid resistance in lead- acid secondary battery cells, (Zur Ermittlung des effektiven elektrischen Widerstandes der Gitter in Bleiakkumulatoren)

EULER KJ

DESCRIPTORS- *ELECTRIC BATTERIES, AUTOMOBILES,

IDENTIFIERS- LEAD-ACID BATTERIES

CARD ALERT- 662, 702

CODEN- AELTA SOURCE- Arch Elektrotech (Berlin) v 54 n 2 July 1971 p 122-6

At the interface between electrode and electrolyte, electrons are set free by the electrode reaction. Already inside the electrode, electrons have to migrate through several series resistors. Thus, a part of the cell voltage will be lost. In heavily discharged automotive batteries with a discharge of 3 to 6 min, the voltage drop across the metallic grid cannot be longer neglected. For the grid resistance optimization, a measuring procedure is found, which allows the evaluation of effective grid resistances, and voltage drop predictions. In German.

ID NO.- EI72X034103     234103
New manufacturing method for lead- acid storage batteries
HALSALL VM; WIETHAUP RR
DESCRIPTORS- (*ELECTRIC BATTERIES, *Manufacture),
CARD ALERT- 702
SOURCE- SAE Pap 720041 for meeting Jan 10-14 1972, 7 p

Unique steps in this process include a modified formation treatment followed by removal of most of the electrolyte through the use of an accelerative force, such as that generated by a centrifuge, to produce a charged and tested finished battery in a moist condition. The new product has superior properties that enable the manufacturer to store and activate it within the battery plant to service the wet battery market or to ship it to the dry charge market as a high- performance long- shelf- life product.

ID NO.- EI72X032878 232878
Auxiliary services for a fuel- cell hybrid electric car
ANDREW MR; GRESSLER WJ; JOHNSON JK; SHORT RT; WILLIAMS KR
DESCRIPTORS- (*AUTOMOBILES, *Electric), FUEL CELLS, STORAGE BATTERY VEHICLES, (AIR POLLUTION, Control),
CARD ALERT- 451, 662, 702, 705
SOURCE- SAE Pap 720192 for meeting Jan 10-14 1972, 14 p

This paper describes the development of the pumps, blowers, and electronic control systems for a fuel- cell/lead- acid- battery hybrid electric car. Wherever possible, commercially available equipment was used in order to reduce costs and expedite the completion of the vehicle. Considerable reductions in cost and complexity could be achieved if the pumps and motors were designed specifically for the car. The duplication of components could be avoided by using one set of batteries, each cell having twice the electrode area of the present ones. The auxiliary pumps could then beeduced to a single electrolyte pump, the air blower and the nitrogen pump. All three pumps could be driven from the same motor.

ID NO.- EI72X031890     231890

Internal resistance of the lead and silver- zinc storage batteries during short circuits

BAYUNOV VV; DASOYAN MA

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- ELKTA   SOURCE- Elektrotekhnika n 7 July 1971 p 59-60

In Russian.

ID NO.- EI72X030549 230549
Fuel- cell/lead- acid- battery hybrid car
ANDREW MR; GRESSLER WJ; JOHNSON JK; SHORT RT; WILLIAMS KR
DESCRIPTORS- *STORAGE BATTERY VEHICLES, (AUTOMOBILES, Electric), FUEL CELLS, ELECTRIC BATTERIES,
CARD ALERT- 662, 702, 705
SOURCE- SAE Pap 720191 for meeting Jan 10-14 1972, 7 p

A prototype hybrid car has been made, using as a power source two 12- cell hydrazine/air fuel batteries in conjunction with six conventional six- cell lead- acid accumulators. The performance of the car, in its present form, falls between that of today's internal-combustion- engined vehicles and that of secondary- battery- powered ones. However, unlike more conventional electric cars, its ranges under town driving conditions and at its steady crusing speed are not limited by the quantity of stored electricity. 10 refs.

ID NO.- EI72X029800 229800

Lead 68. Third international conference on lead, Sept 17- 20 1968, Venice, Italy, organized by European Lead Development Committee (ELDC)

CONF

DESCRIPTORS- *LEAD AND ALLOYS, ELECTRIC BATTERIES, (ELECTRIC CABLES, Sheathing),

CARD ALERT- 535, 546, 702, 706

SOURCE- Pergamon Press Ltd, Oxford, Engl, and Elmsford, NY, 1969, 461 p

Collection of thirty- six papers dealing with lead cable sheathing, lead- acid batteries, and chemical and other applications of lead. Topics considered include lead extrusion methods, extrusion machines, the use of lead- acid cells for storage battery vehicles, and various lead- containing alloys.

ID NO.- EI72X029164 229164

State of development of the electric street car traffic and its future trends, (Stand der Entwicklung und Aussichten des elektrischen Strassenverkehrs)

OEHMS KJ

RWE-Hauptverwaltung, Essen, West Germany

DESCRIPTORS- *CARS, RAIL MOTOR, ELECTRIC DRIVE, ELECTRIC BATTERIES, (AUTOMOBILES, Electric), AIR POLLUTION,

CARD ALERT- 451, 662, 682, 702, 705

CODEN- EKZWA SOURCE- Elektrizitaetswirtschaft v 70 n 17 Aug 16 1971 p 511-17

The important electric drive components for the electric road vehicle, the d c motor, thyristor control, lead- acid accumulator and battery- changing technique are found to be satisfactory in test vehicles for use in West German towns. The impact of the electrically driven vehicles on the air pollution is discussed. In German.

ID NO.- EI72X027032 227032
Battery separator materials
LANDER JJJ
DESCRIPTORS- (*ELECTRIC BATTERIES, *Materials),
IDENTIFIERS- SEPERATOR
CARD ALERT- 546, 702
SOURCE- SAMPE Quart v 3 n 1 Oct 1971 p 27-31

Specific materials and requirements of separators for lead- acid, nickel- cadmium, and silver- zinc batteries are discussed and the present state of technology evaluated to expose research and development areas which could lead to improved separators and battery performance. 6 refs.

ID NO.- EI72X024752 224752

Uninterrupted power supply for radio relay stations in Venezuela, (Unterbrechungsfreie Stromversorgung fuer Richtfunkanlagen in Venezuela)

UNGEHEUER E

DESCRIPTORS- (*RADIO RELAY SYSTEMS, *Power Supply), CRYSTALS, WAVES, COPPER AND ALLOYS,

CARD ALERT- 408, 544, 931

SOURCE- mtech Mitt AEG-Telefunken v 61 n 3 1971 p 171-4

The power supply is either from the public network with a standby station, or by two diesel power plants in continuous operation. Two self- regulating charging devices are used for supplying two lead storage batteries. Details are given on the main.components of the power supply installations. In German. 247d1 612- 702- 716 EI 72 /ELECTRIC BATTERIES/POWER PLANTS, Standby/DIESEL ELECTRIC POWER PLANTS/ //VENEZUELA// PLATES Lattice theory of face- shear and thickness- twist waves in F. C. C. crystal plates; K. J. BRADY (Bell Telephone Lab, Inc, Murray Hill, NJ); Int J Solids Struct v 7 n 8 Aug 1971 p 941- 64; Finite difference equations of motion of the sixth order and the associated boundary conditions for principal planes are formulated for a fcc lattice of mass particles. The equations are solved for face- shear thicknesstwist waves in a plate with free faces. Computations of mode- shapes and the frequency spectrum are presented for copper and the results are compared with a previous solution for a simple cubic material and with the solution of the classical equations of elasticity.

ID NO.- EI72X024751 224751

Uninterrupted power supply for radio relay stations in Venezuela, (Unterbrechungsfreie Stromversorgung fuer Richtfunkanlagen in Venezuela)

UNGEHEUER E

DESCRIPTORS- (*RADIO RELAY SYSTEMS, *Power Supply), ELECTRIC BATTERIES, (POWER PLANTS, Standby), DIESEL ELECTRIC POWER PLANTS,

IDENTIFIERS- VENEZUELA

CARD ALERT- 612, 702, 716

CODEN- TMATB SOURCE- Tech Mitt AEG-Telefunken v 61 n 3 1971 p 171-4

The power supply is either from the public network with a standby station, or by two diesel power plants in continuous operation. Two self- regulating charging devices are used for supplying two lead storage batteries. Details are given on the main components of the power supply installations. In German.

ID NO.- EI72X015283     215283

Role of porosity in the modern technology of the batteries, (Le role de la porosite dans la technique moderne des batteries)

EULER KJ

Varta AG, Hannover, West Germany

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- BUSEA   SOURCE- Bull Ass Suisse Elec v 61 n 22 Oct 31 1970 p 1054-8

The study is concerned with the energy generation in the positive plates of lead and steel storage batteries and dry elements, and the phenomena dependent on their porous structure. During the discharge of the Pb//2 plates, PbSO//4 elements are formed at the pore ends. The spatial distribution of the electrochemical phenomena is shown to be changing very slowly during the battery charging and discharging. The polyporous systems in the dry cells are analyzed to show that in the case of making the porosity locally dependent, even thick electrodes may evenly discharge. 8 refs. In French.

ID NO.- EI72X012069     212069
City car with H//2- air fuel cell/lead battery (one year operating experiences)
KORDESCH KV
DESCRIPTORS- (*AUTOMOBILES, *Electric), STORAGE BATTERY VEHICLES, (AIR POLLUTION, Control),
CARD ALERT- 451, 662, 702
SOURCE- SAE, Intersociety Energy Conversion Eng Conf, Boston, Mass, Aug 3-5 1971 paper 719015 p 103-11
23 refs.

ID NO.- EI72X011714 211714
Electrochemical behavior of lead in sulfuric acid solutions
MILYUTIN NN; OZHIGANOVA NN
DESCRIPTORS- *LEAD AND ALLOYS, ELECTROCHEMISTRY, SULFURIC ACID, (ELECTRIC BATTERIES, Materials), (ELECTRODES, Lead),
CARD ALERT- 546, 702, 801, 803
CODEN- ZPKHA SOURCE- Zh Prikl Khim v 43 n 8 Aug 1970 p 1686-93. See also English translation in J Appl Chem USSR v 43 n 8 Aug 1970 p 1704-9

The nature and mechanism of processes occurring during anodic oxidation of lead are of interest because lead and alloys are widely used in chemical industry, and expecially in production of electric storage batteries. During anodic polarization of lead in sulfuric acid solution it becomes coated with salt layer. At potentials of 0. 25 v and higher, the main reaction of lead sulfate formation is accompanied by formation of lead oxide. At 1. 8 v in a volution of pH 0, bivalent lead ions are oxidized tothe peroxide. The potential of this conversion varies steadily with the solution pH. Oxygen of water is oxidized at the surface coated with lead dioxide. The course of the anodic process of lead oxidation is consistent with conclusions drawn from the equilibrium diagram for the system lead- water-sulfuric acid.

ID NO.- EI71X177444 177444

Production of battery grids based on the reclamation of antimony containing alloys from used battery scrap

MAMBELLI A; COSTA P

DESCRIPTORS- (*ELECTRIC BATTERIES, *Manufacture), (SCRAP METAL, Reclamation),

CARD ALERT- 531, 702, 913

SOURCE- 37th Int Foundry Congress, Brighton, England Sept 1970 paper 1, 12 p

The recovery of battery scrap and of internal dross is, considering the economic aspect, very important for battery factories. After a review of the patent situation and of technical publications on the matter, the authors describe in detail the improved process operating in the factory of Magneti Marelli (Roman Lombardo, Milano, Italia). The process uses a rotary furnace for producing antimonial lead by reduction of lead oxide to metal, of lead sulfate to sulfide with coal and of lead sulfide to metal by reaction with iron sheet. The process takes place under slag with ayield close to the stoichiometric. All principal and ancillary equipment is described in detail, and also the apparatus for fumes, purification which is very important owing to their toxicity. Improvements scheduled for production cycles are proposed to increase the efficiency of the furnace and to obtain directly the reduction of the antimonite (Sb//2S//3) during the recovery process in order to enrich the final alloy with antimony. The casting of thr grids, using highly mechanized facilities is also described. 13 refs.

ID NO.- EI71X175211 175211
Investigation on floating voltage of lead- acid storage batteries
SADA S; HARAGUCHI S
DESCRIPTORS- (*ELECTRIC BATTERIES, *Charging),
CARD ALERT- 702
CODEN- RELTA SOURCE- Rev Elec Commun Lab (Tokyo) v 19 n 1-2 Jan-Feb 1971 p 99-107

It has been found that the optimum floating charge- voltage for batteries using a 1. 215 specific gravity electrolyte is 2. 16 v per cell, that the optimum floating charge for specific gravity 1. 240 electrolyte batteries is 2. 18 v per cell and that their allowable voltage range is plus or minus 2%.

ID NO.- EI71X174469     174469

Behavior of some surface- active materials in the lead storage batteries

MANOIM GI; DASOYAN MA; NOVODEREZHKIN VV

DESCRIPTORS- *ELECTRIC BATTERIES,

CARD ALERT- 702

CODEN- ELKTA   SOURCE- Elektrotekhnika n 1 Jan 1971 p 52-6

Some materials are investigated used in the batteries as depassivators of the negative electrodes ('%'expanders'%'). The possibility of their combination with the inhibitors of the lead oxidation drying with air- ! - oxynaphthenic acid is also studied, as well as the solubility of the surface- active materials in water. The effect is shown of the surface- active materials on the development of the negative electrode surface during cycling, and upon the speed of sedimentation of the lead dioxide suspension in sulfuric acid. 9 refs. In Russian.

ID NO.- EI71X052456     152456
Gassing behavior of lead acid storage batteries in oil compensated systems- 2. Studies at elevated hydrostatic pressures
MARRIOTT JA; CAPOTOSTO JR A
General Dynamics Corp, Groton, Conn
DESCRIPTORS- *SUBMARINES, ELECTRIC BATTERIES, DIELECTRICS,
CARD ALERT- 000
SOURCE- Critical Look at Marine Technology. 4th Annu Conf and Exhib, Mar Technol Soc, July 8-10 1968, Washington, DC. MTS, 1968 p 661-70

The charactierization of dielectric fluids and investigations of the behavior and quantities of gases generated during the charge and discharge of lead acid batteries used in the outboard power supplies of small submersibles were continued. These experimental studies were concerned with the effect of elevated hydrostatic pressures (up to 1000 psi) on battery operations. The application of increased hydrostatic pressures failed to cause any significant overall changes in the quantities of gas(es) produced during operation of the batteries or in the dielectric characteristics of the mineral oil currently employed.

ID NO.- EI71X052449 152449
Gassing behavior of lead acid storage batteries in oil compensated system- 1. Studies at atmospheric pressure
MARRIOTT JA; CAPOTOSTO JR A
General Dynamics Corp, Groton, Conn
DESCRIPTORS- *SUBMARINES, ELECTRIC BATTERIES, DIELECTRICS,
CARD ALERT- 000
SOURCE- Critical Look at Marine Technology. 4th Annu Conf and Exhib, Mar Technol Soc, July 8-10 1968, Washington, DC. MTS, 1968 p 651-60

The chemical, physical, and electrical properties of the mineral oil dielectric fluid used in battery power supplies for small submersibles have been investigated under simulated operating conditions at atmospheric pressures. Bubble formation, growth, size, frequency of release, and rate of diffusion within and out of the lead acid cells have been characterized. The quantity and rate of gas(es) evolved during charge and during discharge have been measured. The amounts of residual gas(es) remaining after charge and after discharge have also been determined.

ID NO.- EI71X050228 150228
Modern maintenance methods assure dependable battery power
BAKER JR CA
Lead Industries Ass, New York, NY
DESCRIPTORS- *INDUSTRIAL TRUCKS, ELECTRIC BATTERIES,
CARD ALERT- 691, 702
CODEN- ECOMA SOURCE- Elec Constr Maint v 69 n 9 Sept 1970 p 116-18

A preventive maintenance program for lead- acid batteries for powering industrial trucks is described. The program includes charging methods, maintenance and test techniques, and cleaning procedures.

ID NO.- EI71X049802 149802

Current blast furnace practice at Murph metals' Southern Lead Company smelter

MURPH DB; PINKSTON JL

Murph Metals, Inc, Dallas, Tex

DESCRIPTORS- *##LEAD SMELTING,

CARD ALERT- 546

SOURCE- Met Soc AIME, TMS Pap A70-41 for meeting Denver, Colo Feb 16-19 1970, 13 p

A water- jacketed blast furnace, 48 in. in diam at the tuyeres and 52 in. in diam at the top is used to produce antimonial lead alloys from reverberatory furnace slags, battery scrap, antimony ore and various by- products. The furnace is operated with oxygen- enriched air containing 30% oxygen. The use of oxygen- enriched air (to 30%) along with careful laboratory control, and careful operating practice increased the average daily production 50%, decreased the average amount of fumes by 63%, decreased coke usage by 27% and decreased tin, antimony and lead losses in the slag considerably.

ID NO.- EI71X047822 147822

Rotary hearth process for smelting lead ores and battery scrap of Bleiberger Bergwerks Union, A.G., Arnoldstein, Austria

DLASKA H; NOTZOLD O

DESCRIPTORS- *LEAD SMELTING, METAL MELTING, SCRAP METAL, LEAD ORE TREATMENT,

CARD ALERT- 531, 533, 546, 913

SOURCE- AIME World Symp on Mmining & Met of Lead & Zinc v 2 1970 p 960-82

The BBU- rotary hearth treat%s lead concentrates and battery scrap by the roast- reaction process. It corresponds in principle to the long- known Newman hearth, however, its hearth- basin is not straight but curved to a closed ring. In operation this annular hearth is filled with liquid lead and rotates around a central blast- box. The charge, heated to a glowing- red, floats on top of the lead %bath, into which air is blown from the blast- box through a horizontal slot-type tuyere. Ore pellets and brown coal are continuously charged onto the reacting mass from two storage bins. Lead is set free by the roasting reactions and trickles through the charge into the lead bath from where it is tapped from time to time. 13 refs.

ID NO.- EI71X046964 146964
Battery materials, 1970 (Electron Mater Rev n 10)
CONRAD P
DESCRIPTORS- *ELECTRIC BATTERIES,
CARD ALERT- 702
SOURCE- Noyes Data Corp, Park Ridge, NJ, 1970, 171 p

The publication covers materials for aqueous battery system including lead- acid, silver- zinc, nickel cadmium and other types of batteries. The '%'dry'%' battery systems reviewed include zinc, magnesium, aluminum, aminoethylene, mercuric oxide and lead acid dry cells. The review includes organic, solid, and molten electrolyte systems, as well as radioactive batteries. The review as a whole is based on data from patents and commercially available products.

ID NO.- EI71X033004 133004

Differential capacitance and cyclic voltametric studies on smooth lead in H//2SO//4 solutions

SHARPE TF

General Motors Corp, Warren, Mich

DESCRIPTORS- *ADSORPTION, ELECTRODES, SULFURIC ACID, ELECTRIC BATTERIES,

IDENTIFIERS- DIFFERENTIAL CAPACITANCE, VOLTAMETRIC, ELECTRODES, LEAD, EXPANDERS

CARD ALERT- 702, 704, 802, 803

CODEN- JESOA SOURCE- J Electrochem Soc v 116 n 12 Dec 1969 p 1639-42

One method for studying adsorption at an electrode surface is to obtain curves showing the relationship between differential capacitance and electrode potential. The purpose of this work was to determine the extent to which organic additi%0es, having known degrees of expander activity, alter the shape of such curves obtained with smooth lead electrodes in H//2SO//4 solutions. Also included in this study were cyclic voltametric experiments to measure the electric current that flowed throughout the potential rangeat which the differential capacitance measurements were made. The adsorption of an organic expander at a smooth lead electrode is undoubtedly distributed differently than that at a lead- acid battery negative plate. Because of its porous nature, the negative plate possesses reaction sites having a wide range of activity. Unlike the smooth lead electrode where the adsorption may be dist%ributed over most of the electrode surface, adsorption at the negative plate may occur only at the most active reaction sites. 10 refs.

ID NO.- EI71X031225 131225
Reserve batteries for Bell System use. Design of the new cell
KOONTZ DE; FEDER DO; BABUSCI LD; LUER HJ
DESCRIPTORS- *ELECTRIC BATTERIES, (TELEPHONE EQUIPMENT, Power Supply ),
IDENTIFIERS- SECONDARY BATTERIES
CARD ALERT- 702, 718
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1253-78

A new cylindrical lead- acid battery has been developed to provide reserve power to sustain telephone service during power- failure conditions. The usage of batteries in the odern telephone plant is discussed, the difficulties encountered with existing cell designs are reviewed, special features of the new design are described in detail, and the scope of the overall development program is outlined. 15 refs.

ID NO.- EI71X030570     130570
Positive grid design principles
CANNONE AG; FEDER DO; BIAGETTI RV
DESCRIPTORS- (*ELECTRIC BATTERIES, *Electrodes), (TELEPHONE EQUIPMENT, Power Supply),
CARD ALERT- 702, 718
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1279-1303

Accelerated test data which show the superior anodic corrosion and growth behavior of pure lead as compared to lead calcium and lead-antimony positive grids for lead- acid batteries in float service are presented. A novel grid design concept has been developed and applied to the design of pure lead circular grids. Batteries incorporating these circular grids increase in capacity with age rather than decrease in capacity as do rectangular grids. 10 refs.

ID NO.- EI71X030569 130569
Tetrabasic lead sulfate as a paste material for positive plates
BIAGETTI RV; WEEKS MC
DESCRIPTORS- (*ELECTRIC BATTERIES, *Materials), (TELEPHONE EQUIPMENT, Power Supply),
CARD ALERT- 702, 718
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1305-19

A reproducible method of synthesizing tetrabasic lead sulfate ($4PbO.PbSO_4$) which produces discrete elongated crystals approximately 22 U long is presented. This results in lead- acid battery positive plates having performance characteristics superior to those fabricated from conventional paste formulations. 12 refs.

ID NO.- EI71X030568 130568
Float behavior of the lead- acid battery system
MILNER PC
DESCRIPTORS- (*ELECTRIC BATTERIES, *Charging), (TELEPHONE EQUIPMENT, Power Supply),
CARD ALERT- 702, 718
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1321-34

The requirements for satisfactory float operation of lead- acid batteries are discussed and behavior during float is analyzed in terms of the kinetic parameters which characterize the electrochemical processes occurring in the overcharge region. Knowledge of these parameters may be used to estimate whether adequate battery maintenance can be expected under specified float conditions.

ID NO.- EI71X030567 130567
Electrochemical characterization of the Bell System battery. Field trials of the battery
O'SULLIVAN TD; BIAGETTI RV; WEEKS MC
DESCRIPTORS- (*ELECTRIC BATTERIES, *Testing), (TELEPHONE EQUIPMENT, Power Supply),
CARD ALERT- 702, 718
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1335-58
The electrochemical characteristics of pure lead circular grids, pasted plates and separators were studied individually and then extrapolated to encompass a full battery. Field trials have confirmed the laboratory tests and have shown that the battery has excellent capacity and float characteristics which ensure that this capacity will be retained for long periods of time. 12 refs.

ID NO.- EI71X030425 130425
Post seals for the new Bell System battery
SHARPE LH; SHROFF JR; VACCARO FJ
DESCRIPTORS- (*ELECTRIC BATTERIES, *Materials),
CARD ALERT- 702
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1405-17

A novel post seal for a new storage battery consists of a cylindrical '%'clamp'%' of a rigid cured epoxy resin molded in place on the lead posts and a flexible one- pience butyl rubber structure attached to the epoxy and to the battery jar cover. Accelerated tests show that the seal effectively slows lead corrosion.

ID NO.- EI71X030315 130315
Techniques for bonding the positive plates
CUSHMAN RH
DESCRIPTORS- (*ELECTRIC BATTERIES, *Manufacture),
CARD ALERT- 702
CODEN- BSTJA SOURCE- Bell Syst Tech J v 49 n 7 Sept 1970 p 1419-46

Two fusion- bonding processes have been devised for bonding adjacent curved- or flat- lead lugs of the positive plates used in a new lead-acid battery.

ID NO.- EI71X029566 129566

Nemo provides new look at ocean depths

DESCRIPTORS- *SUBMERSIBLES, (PLASTICS, Acrylic),

CARD ALERT- 472, 674, 817

CODEN- UNTEA SOURCE- Undersea Technol v 11 n 6 June 1970 p 28-9

The Navy's new NEMO acrylic submersible made of Rohm and Haas Plexiglas G, is 2 1/2 in. thick and bonded with a special acrylic adhesive. The 66 in. diam sphere, constructed from 12 identical curved pentagons, was successfully tested to a depth of 500 ft. Life support for the NEMO is a oxygen bleed system and a baralyme CO**2 absorbent system capable of sustaining two men for 8 hr, plus 24 hr in an emergency. The vehicle has two independent power sources. Main power supply, located in the service module below the sphere, consists of 21 Exide 6- v lead- acid batteries. The life- support emergency powersupply, located inside the pressure hull, is a silver- zinc 24 v d- c battery. In operation, NEMO is lowered into the water from a surface support ship. Ballast tanks are flooded for controlled descent. When NEMO reaches a desired depth, crewmen operate a winch in the service module to lower an anchor for station keeping. The crew can also winch the craft downward and upward along the anchor cable as the situation requires. By adjusting the ballast, the vehicle can also be tilted forward for a better view, and two reversible rotation motors are used to turn the submersible.

ID NO.- EI71X027493 127493

Moving cell control scheme for automated transportation systems

WILKIE DF

Ford Motor Co, Dearborn, Mich

DESCRIPTORS- *STREET TRAFFIC CONTROL, HIGHWAY TRAFFIC CONTROL, TRAFFIC SURVEYS, MOTOR TRANSPORTATION,

CARD ALERT- 406, 432

CODEN- TRSCB SOURCE- Transp Sci v 4 n 4 Nov 1970 p 347-64

The longitudinal vehicle control problem associated with any automated transportation scheme is discussed. The problem of controlling vehicles to attain and maintain an assigned cell on a guideway is modeled as a linear state regulator optimal control problem. The resulting vehicle control scheme requires less information feedback than alternative schemes, and exhibits good vehicle response characteristics. Alternative control strategies that lead to optimal control problems other than the linear state regulator are discussed, and the relative advantages of the scheme are pointed out. 17 refs.

ID NO.- EI71X025717 125717

Dual battery electric powerplant

HIETBRINK EH; WINEBRENER GL; WITHERSPOON RR

DESCRIPTORS- (*AUTOMOBILES, *Electric), STORAGE BATTERY VEHICLES, (AIR POLLUTION, Control),

CARD ALERT- 451, 662, 702, 705

SOURCE- SAE Pap 710234 for meeting Jan 11-15 1971, 8 p

General Motors has powered an Opel Kadett with a set of mechanically rechargeable zinc- air batteries, which have sufficient power density to have potential as a power source for low performance vehicles. A lead- acid battery system is used as the augmenting power source. Control is provided by a frequency and pulse width modulation system. Testing developed two problems that preclude economical production of this propulsion system- excessive electrolyte evaporation and the difficulty of keeping batteries at operating temperature (150 F) while maintaining adequate air distribution to prevent cathode oxygen starvation.

ID NO.- EI71X025389 125389

Electron microprobe study of the active materials in the lead- acid storage battery

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Toyota Central Res & Develop Lab, Inc, Nagoya, Japan

DESCRIPTORS- (*ELECTRIC BATTERIES, *Materials), ELECTRODES, (ELECTRIC BATTERIES, Electrodes), LEAD COMPOUNDS,

IDENTIFIERS- ELECTRON PROBE, ELECTRODE PLATES, STORAGE BATTERIES

CARD ALERT- 702, 704, 803

CODEN- JESOA SOURCE- J Electrochem Soc v 116 n 10 Oct 1969 p 1407-9

The dependence of the concentration of PbSO//4 and its distribution on charge and discharge in the electrode plate were examined in commercial lead- acid storage batteries by using an electron probe x-ray microanalyzer. The concentration change of PbSO//4 in the negative plate during discharge was found to be stationary with the depth from the surface. Similar distribution curves of PbSO//4 were also obtained for the electrode plates during charging. 6 refs.